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Original Communications

THE USE OF RADIUM IN CANCER OF THE FEMALE GENERATIVE ORGANS*

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From the Gynecological and the Physical Departments, Memorial Hospital

IN THE gynecological department cancer of the cervix is the chief lesion that calls for treatment and its varied form and development offer many problems in technic. Cancer of the body of the uterus, of the vagina and vulva, and occasionally of the ovary complete the list of malignant conditions treated on our service.

TECHNIC FOR CANCER OF THE CERVIX

Our work began in January, 1915, with a limited amount of radium so that throughout this year we were able to command amounts not greater than 50 milligrams for one dose. The Continental methods then in use were copied and consisted largely in the application of radium in heavily filtered capsules of lead. The chief factor in the technic was the application within the cervix of radium, filtered by 2 mm. of lead and a vaginal application with the lead capsule contained in a small rectangular box of tin, 3 by 2 by 1 cm. in measurement. This box was placed in the vault of the vagina and held there by a pack of gauze. In addition there were developed two methods of conveying the rays by crossfiring to the affected part. (1) A silver probe applicator was placed in the body of the uterus and held there by means of an adhesive strap band, as the wire curved over the symphysis and (2) a lead applicator was placed high within the rectum,

*Read at the meeting of the American Radium Society held in Boston, June 6, 1921.

about at the level of the uterosacral ligaments. This was held in a T-crosspiece of rubber tubing similar to the ordinary vaginal drainage tube.

While the cases falling under our care during this year were for the most part, advanced, and with very slight opportunity, in any case, of effecting a cure, the fact remains that 10 per cent of those treated are well and still free of the disease. There were many cases that passed through a period of suffering from the radium effects on the bladder and rectum and there were a considerable number that developed rectovaginal fistulae. It became evident, therefore, that the technic would have to be changed so as to protect these organs.

During the year 1916, the technic was varied with this in mind and the amount of radium at hand permitted us to use 100 millicuries of emanation. The applications by vagina and rectum were largely discontinued and three applications were made within the cervix and the neck of the uterus. For the sake of convenience these applications were placed one week apart but it was considered from the standpoint of effect as if the dose was given at one time. The filter was changed from 2 millimeters of lead to one millimeter of platinum but the real outstanding feature of the technic of this year was that no capsule was used that was not filtered by either cervical or uterine tissue. The vagina was firmly packed with gauze, thus pushing the rectum and bladder away from the cervix as far as possible.

Although the total average dose was much higher, there was a striking difference in the comfort of the patient. Proctitis and cystitis cases became fewer in number and there were few rectal fistulae developing during the year. In out-growing cancers, cauliflower type, experimental trials were made with steel needles containing about 30 millicuries of emanation.

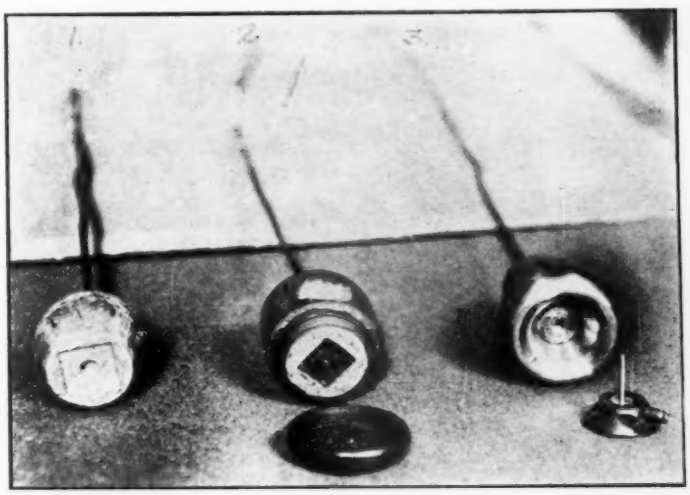
The results obtained by Dr. Barringer with these needles plunged into the cancerous prostate would indicate that there might be a field for their use in uterine cancer. However, in the ingrowing types of cancer, the distorted anatomy, dilating and displacing the ureters and changing the position of the uterine vessels would seemingly limit the field, at least for such large doses. They cause rapid disintegration of outgrowing tumors but in most instances are accompanied by deleterious effects on the vaginal wall. It is better to burn off these outgrowths with a cold cautery before implanting the radium.

THE PERCY OPERATION

During the year 1915-1916 a Percy or modified Percy operation was performed in thirty cases. The abdomen was opened and in all instances, the burning was conducted with an assistant's hand holding the uterus. In a considerable number of cases, the vessels were

tied off in addition. The operation was followed by radium, the first application usually about two weeks after the operation. The results from this procedure were not good, the majority of the cases developing rectovaginal fistulae. However, there are three cases* that have remained well up to the present. In one or two patients the results following the ligature of the vessels were disastrous, leading to a sloughing of the tissues of the pelvis.

The criticism of this work would lead to the conclusion that the blood supply should not be interfered with to the extent of tying off the vessels and further that with the abdomen open and the uterus held in the hands of an assistant, there is a tendency on the part of the operator to burn too extensively and beyond what is advisable, if radium is to be used later. In other words, the tissue sloughed away following the burning leaves a very thin wall between the cervix and



a *b* *c*

Fig. 1.—Various forms of radium applicators. *a*, Old lead "bomb"; *b*, Mercury iron filter; *c*, a newer mercury-iron contrivance.

adjoining parts and the slough which regularly follows radium dosage, applicable to the treatment of cancer, breaks through this thin barrier. In the latter years, this form of treatment has been modified by burning away the papillomatous parts of the lesion from below without opening the abdomen and thus creating an excavation in the cervix large enough to hold the radium capsule. The radium is applied at once and a number of good results have followed this method.

The results of the repeated doses of radium within the cervix were not very good. However, during this year the class of cases were almost all of the advanced and the advanced recurrent types. As the

*Two cases operated in the above manner in another hospital service and then transferred to us. All of the Percy operations were performed by Dr. George H. Mallett, at that time in charge of the service.

cervix itself could in most instances be taken care of satisfactorily, it was found necessary to use some other method of radiation to affect the tissues infiltrated by direct extension and by the lymphatic invasion of the tissues in the parametrium adjoining the cervix.

THE DEVELOPMENT OF THE "BOMB" TECHNIC

The application of radium placed in the vault of the vagina with the ordinary filter leads to irritation of the bladder and rectum, if the dose is above 1500 mc. hours. Kelly and Burnam, to overcome this difficulty, placed the radium in the vaginal vault with a cover of beaten gold. They also devised a lead cup to be placed over the

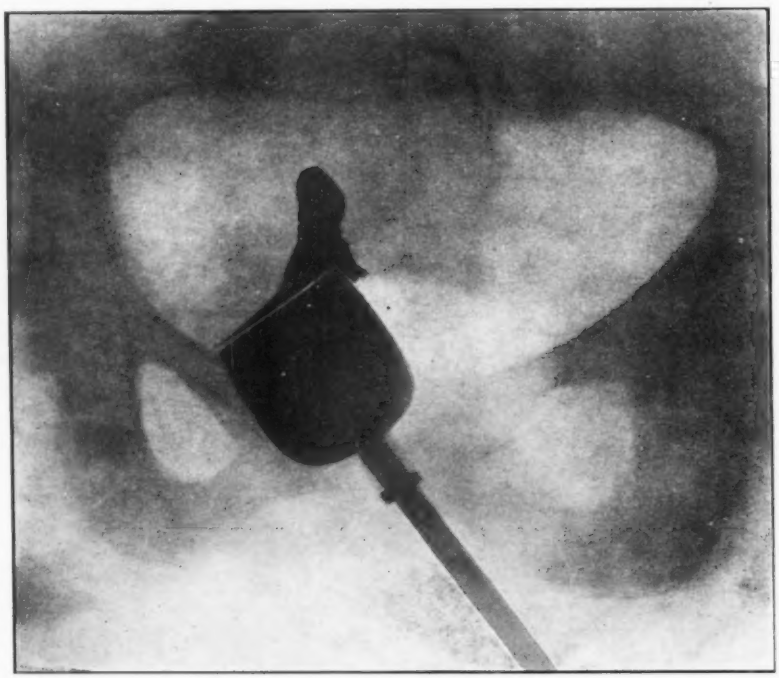


Fig. 1—*A*.

radium capsule and by these methods they were able to filter the back and sides of the capsule so that very small amounts of radiation reached the adjoining organs.

In 1916, a lead capsule consisting of a small piece of lead pipe was fastened to a stiff rod so that the rays might be directed to various quarters. This idea was at once improved upon by making a small lead globe with a diameter of 3½ cm. with one pole sawed off and a set-in provided to hold the platinum capsule. This was applied with the capsule containing 1000 mc. of emanation. It was soon found that the cone of rays was too small and another apparatus was built which consisted of a thin capsule of iron. Into this was poured mercury

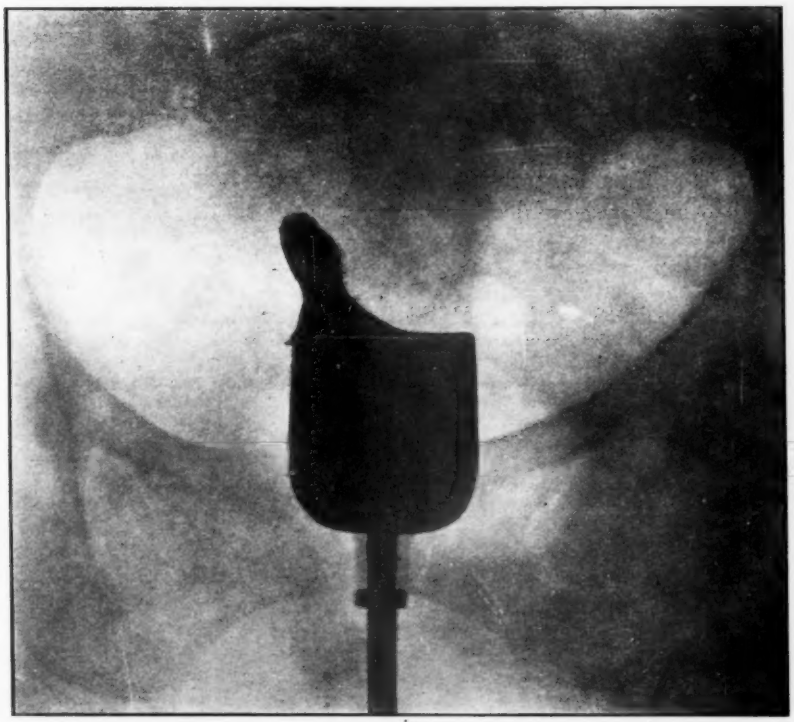


Fig. 1—*B*.

Fig. 1—*C*.

Figs. 1—*A*, *B*, and *C*.—Roentgenograms showing shadows of the bomb placed directly against the lesion in the vaginal vault and against the right and left parametrium. The cervical ulcer is packed with bismuth gauze.

to a depth of 2 cm. At the top of the apparatus was a receptacle with its sides protected by 6 millimeters of lead and in this area was placed the radium. Over this was a 1 millimeter platinum filter with a hard rubber cap. This instrument was used through the years 1917, 1918, and 1919. Radium up to 1000 millicuries was placed in the container and directed first to one side, then to the center, then to the opposite side of the vaginal vault. This has been termed the "bomb" because of its almost exact resemblance to the small hand grenades used in the war. With this instrument we have been able to give 3000 millicurie hours of radium treatment in the vaginal vault with but little irritation of the bladder and rectum. (Figs. 1, *A*, *B*, and *C*.)

We still had some trouble with rectal irritation because of the sagging of the pelvic floor due to the weight of the apparatus. At the suggestion of Dr. Bagg, a frame was built which is placed on the patient's bed and may be so arranged that she is in a fixed position with her legs placed in comfortable leg holders. In a track in this frame is a standard with a universal ball joint at the top which holds the entire weight of the applicator and yet enables the accurate placing of it. However, even with the aid of the above described applicator and with the radium capsule located in the cervix, the rays reaching the parametrium at a few centimeters distance are very feeble. It is necessary to reinforce them, as far as possible, by means of radium passing through the skin from several portals about the pelvis.

THE BLOCK TREATMENT

It was found by graduating the doses that 3000 millicurie hours at 4 centimeters with 2 millimeters of lead and 4 cm. of wood as a filter closely approximated the skin dose when it was applied in conjunction with the other radium. The areas selected for this type of application are directly over either groin and through the center of the symphysis on the front part of the body; against the sacrum and over either sacroiliac joint on the back. The diagram shows that each external application not only furnishes a definite radiation to a certain point in the parametrium but it is reinforced by each of the other five applications. Under such combined treatment the average case receives in all about 9000 to 18000 millicurie hours, depending upon whether the brass or lead block is used. (Fig. 2.)

In general the method outlined has been continued from 1917 to the present time, the variations being merely those of dosage rather than technic. In the latter part of 1919 and up to the present time, more and more use has been made of the direct embedding of bare glass tubes containing emanation. We have entirely confined our attempts in this direction to the small dosage, 1 millicurie being the highest used and ½ millicurie being the average strength of each tube. The

method of burying emanation tubes is particularly applicable to vulval and vaginal cancers and has some value in the treatment of recurrent cancers where there are definite nodules behind the vaginal vault.

The Physical Department, under the charge of Mr. G. Failla, has been able to estimate the dosage administered by these various methods in terms of a skin dose (as used by us). They have also been able to accurately measure the dispersion of the rays from the front of the mercury "bomb" and from their computations have been able to build a new instrument of lead which correctly filters the sides and back of the radium and delivers in front a cone of rays of known extent. The most practical feature of their

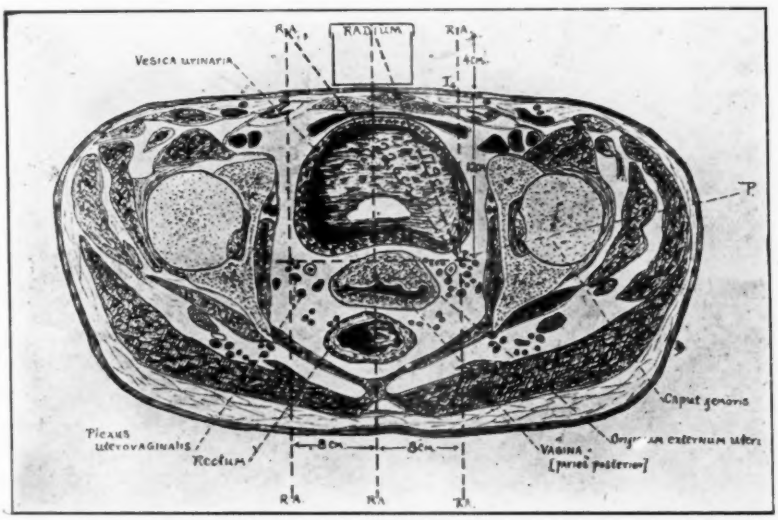


Fig. 2.—Diagrammatic horizontal cross-section of female pelvis, showing small amount of tissue through which the rays pass from surface applications on abdomen and back. Point *P* in the parametrium about 12 cm. from either surface.

work is the measurement of the intensity of the radiation at any point within a given area, in our case, the pelvis.

MEASUREMENT OF RADIATION

The purpose of the steel-mercury appliance was to furnish an intense beam of radiation in the forward direction and as little as possible laterally. In order to find out the actual distribution of radiation about the instrument an apparatus was constructed which gives the ionization produced by the radiation in different directions. (Fig. 3.) *I* is a conical lead ionization chamber, connected to a gold leaf electroscope in a lead case *E*, by a wire passing through the paraffin-filled tube *R*. The bomb is mounted at *B* on a support which moves on a pivot so that it can be rotated through any desired angle, which is measured on a scale *S*. The center of the tubes in the bomb is on the axis of the support, so that as the bomb is rotated, the radiation entering the ioniza-

tion chamber passes through different thicknesses of filter. Therefore, the intensity of this radiation varies and the electroscope records this variation. Differences in intensity due to differences in distance do not enter into this experiment, since the relative positions of the source of radiation and the ionization chamber are the same throughout. Readings were taken at intervals of 10 degrees, giving a curve such as is shown in Fig. 4-*A*. This is for the steel-mercury bomb. The values are based on the intensity in the forward direction as 100 per cent since we are concerned only with relative values. From this curve, we see that the intensity is much greater in a forward than in a backward direction, but still 60 per cent as much comes from the sides as from the front.

Accordingly a new bomb was designed, which is shown in Fig. 1. For the protective filter lead was used, and over this a thin aluminum shell to remove the soft secondary radiation of the lead. The diameter of the bomb at the top is 3.4 cm., at the widest part 4 cm., and its total height is 4.2 cm. The rectangular pocket for the tubes is 12 mm. deep,

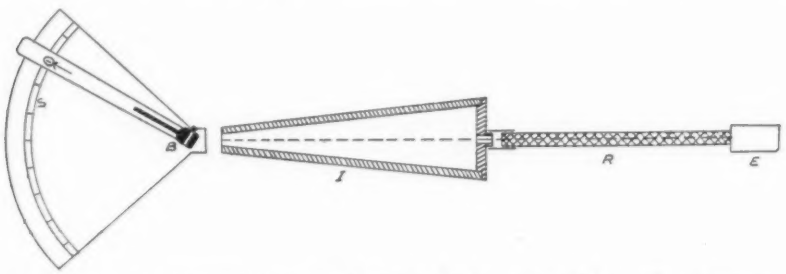
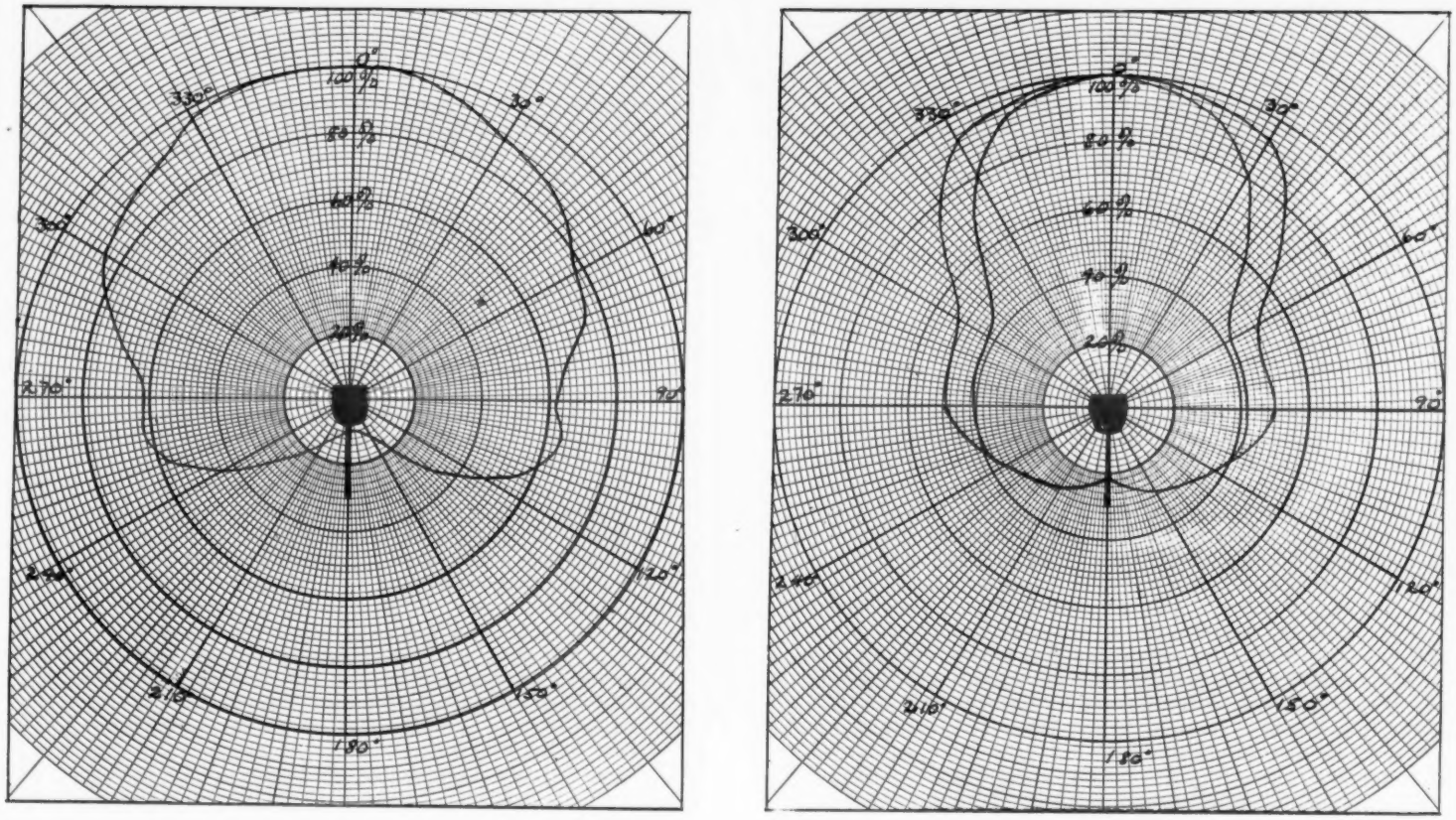


Fig. 3.—Diagram of apparatus for measuring distribution of radiation. *E*, electroscope; *R*, paraffin-filled brass tube; *I*, ionization chamber; *B*, bomb; *S*, scale.

16 × 10 mm. at the bottom and 16 × 14 mm. at the top, so that it can hold several of the enameled silver tubes ordinarily used at the hospital. The pocket is covered by a platinum plate 1 mm. thick. Therefore the filter for the useful beam of radiation is 1 mm. of platinum in addition to the silver tubes. The purpose of a rectangular pocket was to afford as much screening as possible for the lateral radiation in at least two directions. It was intended that when the applicator was in position, these two thicker sides should be toward the bladder and rectum, where it was desired to have as little radiation as possible.

The distribution curves for this applicator are shown in Fig. 4-*B*. It will be seen that in the direction of greater filtration, that is, toward the bladder and rectum, the intensity is 30 per cent less than from the steel-mercury bomb. This lead bomb was therefore adopted for the routine treatments.

Recent experiments have shown that it is not necessary to use such a heavy filter in order to get a sufficiently penetrating beam of radiation for deep therapy. Filtration by 1 mm. of brass plus ½ mm. of



A *B*

Fig. 4—*A* and *B*.—Curves showing distribution of radiation about "bombs." The total radiation in a forward direction is 100%. *A*. Steel-mercury bomb. Too large a proportion of lateral radiation. *B*. Lead bomb, with platinum filter. This is the applicator used at present.

silver has been found sufficient.* Therefore the bomb was tested with the platinum piece replaced by 1 mm. of brass. The distribution curves for this arrangement show a gain in intensity in a forward direction of about 20 per cent for the same lateral intensity. The block has also been changed so that the filter now is 0.5 mm. of silver, 2 mm. of brass, and 1 cm. of bakelite. With this block we get just twice as much penetrating radiation as with the lead.

Distribution curves have also been obtained for the silver and platinum tubes in these treatments. One of these is shown in Fig 5.

The next step in the problem was to estimate the amount of radiation

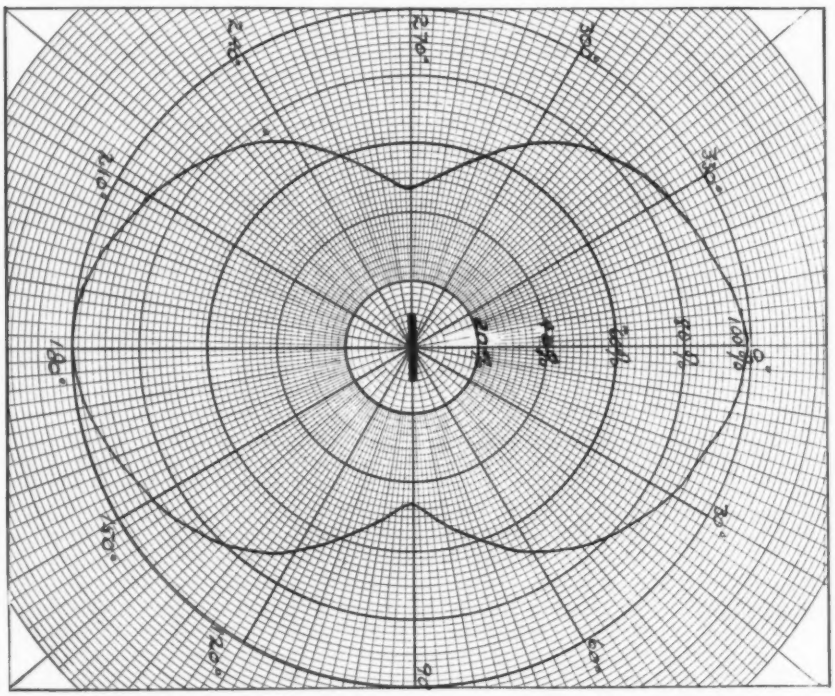


Fig. 5.—Curve showing distribution of radiation about the platinum tube.

delivered at different points within the body, due to the bomb, block and silver and platinum tubes as used in the actual treatments. The two factors which enter into the decrease in the amount of radiation are the distance from the source and the absorption by the intervening tissues. The decrease due to distance was calculated according to the inverse square law, that due to absorption was obtained experimentally, and the two combined to give the intensity at different points. The density of tissue being nearly the same as that of water, the absorption is substantially the same. Accordingly measurements

*Quimby, E. H.: The Effect of Different Filters on Radium Radiations. American Journal of Roentgenology, September, 1920.

were made of the absorption by different thicknesses of water of radiation from these different applicators. To calculate the amount of radiation reaching different points, the percentage transmitted by any given thickness of water was multiplied by the factor expressing the decrease due to the inverse square law. For the unit of ir-

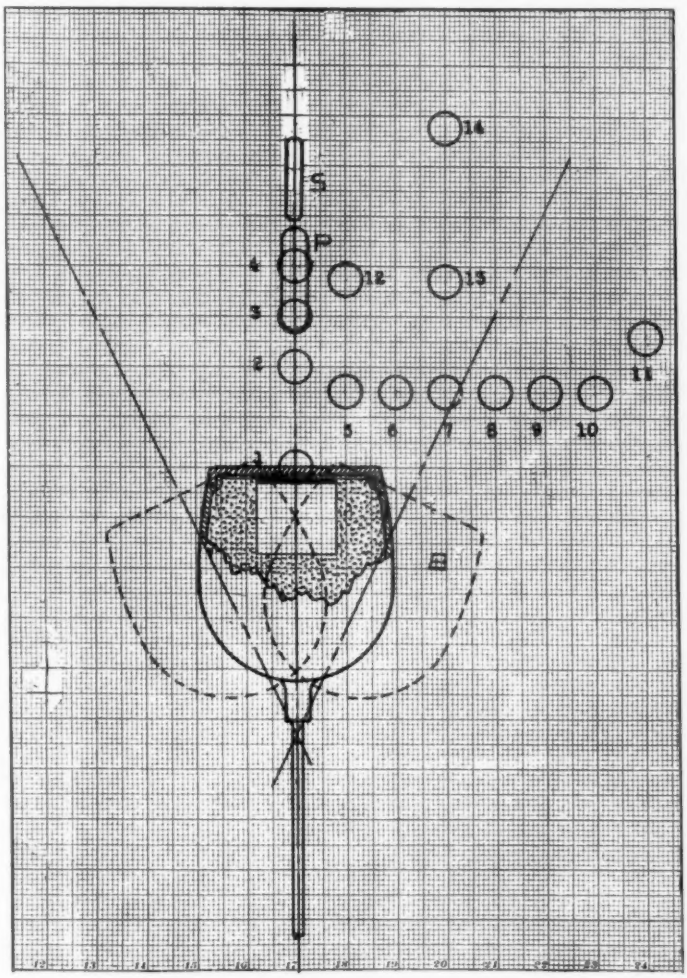


Fig. 6.—Diagram showing radium "bomb" and tubes in same relation as in vagina and uterus of patient. The figures in front of the bomb are arranged arbitrarily. Table I represents the radiation in terms of a skin dose at each of these points. *B*, the bomb; *P*, platinum tube; *S*, silver tube. Point 1 is on the actual surface of the bomb. Point 2 is 2 cm. above. Point 3 is 3 cm. above, but also on the surface of the platinum tube. Point 4 is 4 cm. above the surface of the bomb, on the platinum tube. Points 5 to 10 represent points 1 to 6 cm. from the median line and 1½ cm. above the surface of the bomb in its center position. Point 11 is 7 cm. from the median line and 2½ cm. above the surface of the bomb. Point 12 is 4 cm. from the bomb and 1 cm. from the platinum piece. Point 13 is 4 cm. from the bomb and 3 cm. from the platinum piece. Point 14 is 7 cm. from the bomb and 3 cm. from the silver tube.

radiation was selected the "skin dose." This is based on clinical observations of the effect on the skin of different applicators used at the hospital for the treatment of deep-seated conditions. The

"skin dose" as used at the Memorial Hospital corresponds to the irradiation from a treatment of 3200 mc. hours with a filter of 0.5 mm. of silver, 2 mm. of brass and 1 cm. of bakelite in an applicator with brass sides, the radium being 4 cm. from the skin. This is more than twice as much as can be used on patients undergoing the treatment discussed in this paper, because of the additional radiation received by the skin from the other applicators,—bomb, block, tubes, etc.

Fourteen points were taken, located as shown in Fig. 6, at different positions within the pelvis, from No. 1, directly on the surface of the bomb in its median position, to Nos. 10 and 14 in the parametrium. The intensity of irradiation at each point due to each applicator, considering the bomb in three positions and the block in six, as usually used, was calculated. The results are shown in Column 6, Table I. It will be seen that the dose received by these points varies from about one-fourth of a skin dose at the most distant one considered, to several skin doses near the central applicators.

TABLE I

INTENSITIES OF IRRADIATION AT POINTS SHOWN IN FIG. 6

1 POINT	2 SILVER TUBE	3 PLATINUM TUBE	4 BOMB	5 BLOCK	6 TOTAL (MINIMUM)	7 TOTAL (NEGLECTING ABSORPTION)
1	0.06	0.14	2.75	0.06	3.03	3.27
2	0.14	0.62	0.41	0.06	1.22	1.83
3	0.28	64	0.28	0.06	65	65
4	0.66	64	0.17	0.06	65	65
5	0.13	0.53	0.61	0.07	1.34	2.33
6	0.14	0.41	0.50	0.07	1.11	1.60
7	0.12	0.29	0.36	0.06	0.85	1.11
8	0.10	0.19	0.26	0.06	0.62	0.99
9	0.08	0.13	0.17	0.06	0.44	0.71
10	0.06	0.09	0.16	0.06	0.37	0.54
11	0.06	0.07	0.01	0.06	0.26	0.45
12	0.71	5.6	0.18	0.06	6.54	7.07
13	0.31	0.55	0.16	0.06	1.08	1.44
14	0.43	0.18	0.06	0.05	0.72	1.02

These values represent the minimum amount of radiation delivered, no allowance being made for secondary and scattered radiation, which recent experiments have shown to be an important factor; making the dose much higher than that obtained by calculations such as these. Column 7 gives the theoretic maximum of irradiation, absorption being neglected and the only decrease considered being that due to the inverse square law. The actual amount of penetrating radiation reaching a given point is somewhere between these two values. However, the ionization taking place at the point and producing the therapeutic effect is greater than would be indicated by these values, on account of the soft secondary radiation generated by the penetrating radiation in the tissues.

CANCER OF THE BODY OF THE UTERUS

The technic of the radium application in the cancer of the body of the uterus depends upon whether the uterus is to be removed following the treatment. We believe, where there are no contraindications to the operation from the standpoint of the general constitution of the patient, that the removal should follow the radium treatment in all cases. The extent of the disease must remain unknown because it is in a position where neither sight nor sense of touch can aid one. However, there are certain cases where, owing to age or other disability, one has to remain content with the radium treatment.

In the first instance, where operation is to follow, radium is placed in a platinum capsule within the body of the uterus, preferably in a tandem piece, so that a large part of the organ may be radiated. The dose should be a total of 3500 mc. hours and the removal of the organ should follow at the end of six to eight weeks. We believe that there should be no earlier removal because of possible local inflammatory effects.

After the organ has been removed, external radiation should be given by the block technic. In cases where it is known that the organ is not to be removed, beside the 3500 mc. hours within the body of the uterus, the "bomb" is directed toward the parametrium on either side by one hour and in addition the block is applied to six areas about the pelvic girdle.

CANCER OF THE VAGINA AND VULVA

Cancer of the vagina and vulva are both treated by buried radium emanation. The strength of each tube is about 0.5 mc. In addition, filtered radium is administered by means of the "bomb" in the vagina or by tubes placed in dental compound if the involved area is at the entrance of the vagina or on the anterior wall. The glands of the groins in vulval carcinoma are radiated by the block method and in some instances are later removed by dissection and the open area infiltrated by bare tubes placed 1 cm. apart. In the vaginal cancer, the external radiation is given by the regular block technic through six areas.

RECURRENT CERVICAL CANCER

Recurrences are either behind the vaginal vault or by outgrowths in the vault of the vagina. Here again, the bare tubes, "bomb," and "block" are the methods selected. If there is a crater in the vault of the vagina a platinum capsule is inserted for not more than 1200 mc. hours.

Table II shows an analysis of results in 600 cases of uterine cancer and in 32 cases of vulval and vaginal cancer, followed to May 1, 1921.

TABLE II

RESULTS IN 600 CASES OF UTERINE CANCER AND IN 32 CASES OF VULVAL AND VAGINAL CANCER

(Followed to May 1, 1921)

RADIUM TREATMENT	1915	1916	1917	1918	1919	1920
Advanced Primary Cervix	15	24(1)	41	41(7)	69(23)	92(58)
Recurrent	18(1)	8(1)	26(2)	35(8)	43(17)	37(27)
Early, Operable Cervix	1(1)	3	3(2)	4(2)	9(7)	14(9)
Borderline Cervix	0	3(2)	3(2)	17(5)	10(7)	12(8)
Percy	15(2)	11(1)	3	0	0	0
Ca. Body of Uterus Prophylaxis Following Hysterectomy	1(1)	1	0	7(3)	5(3)	5(5)
Ca. Vulva and Vagina	0	1	0	6	11(4)	14(8)
	50	51	78	118	151	184

(Figures within the parentheses represent the number of cases alive May 1, 1921.)

The follow-up of these cases through the entire year 1921 will appear in the Annual Medical Report of the Hospital.

DISCUSSION OF RESULTS

From January, 1915, to January, 1921, there were 600 cases of uterine cancer and 32 cases of vulval and vaginal cancer treated with radium. The follow-up has been continued to May 1, 1921, and the figures in each group show the total number of cases treated, with the number of those alive placed in the parentheses. In the group of the first three or four years, that is from 1915 to 1918, the figures will probably remain as they are, for the cases that have lived through such a long period are presumably cured and their number will only diminish through death from intercurrent disease.

The follow-up is continued by weekly clinics, by visits of Social Service nurses and by letter. No case is discharged and those that are lost through failure to return or by change of residence are classified as dead. We find that these patients are so thoroughly impressed by their treatment that if they do not return or continue in the follow-up clinic, the reason is usually due to their ill health caused by the advancement of the disease. There have been a few who discontinued their treatment before it was completed but even these cases, since 1918, have been included in our lists because in our technic, all the treatment is given in 24 hours. In other words, they have discontinued the follow-up observations not the treatment.

We feel that the technic which has been standardized since 1918 and by means of which the parametrium is thoroughly radiated, will provide us with better results than we have had in previous years. However, the number of those alive in the 1919 and 1920 groups will drop to a considerable extent, especially in the two classes, advanced primary and recurrent cancer.

EARLY OR OPERABLE CANCER OF THE CERVIX

This group is the most important one and demands a few words of explanation. In the year 1915, the one case was a woman of about seventy years who had a very early cervical lesion but with the specimen showing epidermoid carcinoma. She has remained well. Of the 3 cases of 1916, one was operated in another clinic within a month after our treatment and died on the third day following the operation. The uterus removed showed no carcinoma. The second case died of appendicitis a few months after treatment and the diagnosis was confirmed by a visit from one of our staff. The third case, one month after treatment, had an attack of acute rheumatism and died of cerebral embolus.

Of the three 1917 cases, two are alive and the third died of cerebral hemorrhage in November, 1919, at which time there was no evidence of cancer.

Of the four 1918 cases two are alive and two died from the disease.

Of the nine cases in 1919, two are dead. One had in addition to her pelvic trouble, carcinoma of the breast and the other had a hysterectomy after our treatment was completed and died this year of recurrent carcinoma.

In 1920, there were 14 cases in all, with three deaths from the disease. One patient was lost from our records because she gave us a false address. Another died ten days after the radium treatment following a hysterectomy in another clinic performed against our advice. Of those dying from the disease, one had a hysterectomy by us about two months after her treatment and radium was inserted in the parametrium. Notwithstanding this treatment, carcinoma developed throughout the pelvis. The second patient had a general glandular metastasis with carcinoma of the neck, axillae and the groins. The third case had an attack of typhoid fever within a month after the treatment and although she recovered from this, her health never improved and she returned home to die.

Two of the fourteen cases had negative specimens but the clinical examination conducted separately by Dr. Stone on the admission of the patient and by me with the patient under an anesthetic showed all the evidences of early carcinoma. It is our contention that notwithstanding the negative specimen they should be considered as early carcinoma. In the early or operable group, there are six cases where a valid excuse occurs for their removal from our list. If these six cases remain in the list there are 34 in all for the years from 1915 to 1920 and if they are thrown out, there will remain 28 cases with 23 alive. Of course it is to be remembered that in regard to the 1919 and 1920 cases very little time has elapsed. These cases are free of clinical evidence of the disease.

BORDERLINE CANCER

Of the three cases of 1916 one is dead, although she remained well for more than four years and died of cerebral hemorrhage following an attack of pleurisy in March, 1921.

There were three cases in 1917. One died from the disease. Of the 17 cases in 1918, all but five died of the disease. Reviewing the histories of these cases it would seem that according to the classification of today, a number would not be considered as borderline but as advanced primary cases.

Of the ten cases in 1919, three are dead of cancer and seven are alive and free of evidence of the disease. One of these patients had a hysterectomy following her treatment. Of the 12 borderline cases of 1920, four are dead of the disease. One is in poor condition but the others are free of clinical signs of tumor. There is a total of 45 cases during these years, 1915 to 1920, and 24, are still alive. There are three cases of this group who are now clinically cured but who have rectal fistulae.

BODY OF THE UTERUS

The one case of 1915 is well today. One case in 1916 had her uterus removed some time after the radium treatment and carcinoma was present, the patient dying some months later. Of the seven 1918 cases only three remain alive. Of the four cases classified as dead, two dropped out of our follow-up clinic shortly after their treatment. The other two died of the disease nearly three years later.

Of the five cases in 1919, two are dead. One died from the disease and the other from pneumonia about six months after the treatment. In 1920 there were also five cases and all are alive and free of signs of disease. Of the total of 19 cases of cancer of the body that were treated throughout these years (1915-1920) 12 are alive and well.

RECURRENT CANCER

The recurrent cancer forms a large group with a very high mortality. Those cases that are alive represent the early recurrent cancer where only small areas in the vault of the vagina or in the nearby parametrium were involved. The 17 cases alive in 1919 and the 27 in 1920 will be gradually reduced in numbers at the end of a few more years for many of them still have evidences of cancer.

ADVANCED PRIMARY CANCER

Of the 80 cases treated during the years 1915, 1916, and 1917, there is but one alive. The years of 1918, 1919, and 1920, we feel will give a much higher percentage, but the 23 cases of 1919 and the 58 of 1920 that are still alive will be greatly reduced in numbers in the course of another year or two.

PROPHYLAXIS

We come now to a more hopeful group, those who had no evidence of recurrence following hysterectomy and who were treated as a prophylaxis against the return of the disease. The two cases treated in 1917 both developed cancer and died, but of the eight who were treated in 1918, six are free of the disease. Of the four in 1919, three are alive and of the ten cases treated in 1920, all are living. There are 19 cases in this group that are now free of clinical evidence of the disease.

CANCER OF THE VULVA AND VAGINA

This subject has been separately reported by us, and there are great prospects in this field through the use of bare weak tubes plus the filtered radium. Our results are encouraging, but as yet there is no surety that the disease will not recur.

SUMMARY

The full technic, using the external radiation as an aid to the capsule and bomb was not in routine use until 1918. If the advanced primary cancer and the recurrent cancer groups are taken together, there were 132 cases treated before January 1, 1918, and there are but 5 cases alive today. If these same groups are taken for 1918, there are 76 cases, and 15 are alive, for 1919, 112 and 40 are living, for 1920, 129 and 85 are still alive. While the prospects of greatly reducing these figures are present and sure, nevertheless, the indications are that in these groups we have had our greatest advance.

The follow-up of our operable and borderline classes will have to be continued through three or four more years before deductions may be made. Our present figures are remarkable and indicative.

In the prophylaxis after hysterectomy great care must be used that the tissues are not overradiated. The end results in this class are very good for the time elapsed since treatment.

We believe that these results cannot be duplicated without the use of massive doses of radium or without thoroughly radiating the parametrium.

MEMORIAL HOSPITAL.

THE ACTION OF THE COMMONER ECBOLICS IN THE FIRST STAGE OF LABOR*

By M. Pierce Rucker, M.D., Richmond, Va.

From the Department of Obstetrics, Medical College of Virginia.

THE use of dilating bags affords us an excellent opportunity of studying the variations in pressure that take place within the uterus in the first stage of labor as the result, not only of changes in posture, respiration, vomiting, etc., but also of drugs commonly used at this time. It is to this phase of the subject that I wish to direct your attention. I can find no reference to the Voorhees bag being utilized in such a manner. Schatz,[1] 1872, obtained tracings of uterine contractions by introducing a small rubber bag, attached to the end of a stiff tube between the amnion and the uterine wall. The bag was partly filled with water and was connected with a manometer which not only measured the intrauterine pressure, but recorded it upon a moving drum. H. Hensen[2] made use of Schatz' method to investigate the influence of morphine and ether upon labor pains. In his article he states that Smolsko, (1876), found that moderate doses of quinine strengthened and lengthened uterine contractions without changing their physiologic character, and that larger doses caused the contractions to cease entirely. Rubesamen[3] criticizes Schatz' method first, because a foreign body is introduced within the uterus, which might possibly influence uterine contractions, and, secondly, because with it you are unable to investigate the third stage of labor. He used in his work a 500 gm. weight that rested upon the abdomen and was connected with a writing lever by a string and a series of pulleys. Such an arrangement would give an accurate record of the rhythm of uterine contractions in all three stages of labor and the height to which the uterus rises at each contraction, but does not measure the intrauterine pressure or the strength of the contractions, nor could it give information as to the effect of coughing, vomiting, etc. He found that quinine stimulates contractions slightly when the uterus is already contracting, but that it does not initiate them. It seems entirely inactive when used in postpartum atony.

The method that I have employed in making the tracings can, of course, be used only in the first stage of labor. In fact, towards the end of the first stage, when the bag is nearly out of the cervix, the manometer fails to register the full force of the uterine contractions,

*Read at the Thirty-Fourth Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, St. Louis, Mo., September 20-22, 1921.

unless a tight vagina gives the bag support. It is open to the same objection as is Schatz' method, in that a foreign body is introduced within the uterus which might have some influence upon uterine contractions. That such influence is slight, is realized when one thinks

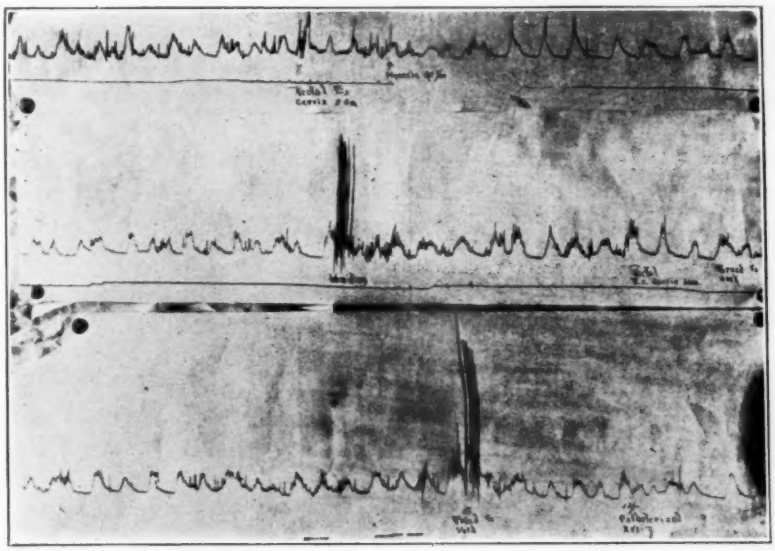


Fig. 1.—Hyoscine, gr. 1/100, administered at point indicated by arrow. Note the comparative absence of voluntary effort after this time. The record shows the effect of vomiting in the middle of the second line, and the effect of attempting to void in the bottom line. Sixteen ounces of urine were removed with a catheter five pains later. The timer marks minutes, wherever it works, in this and all subsequent records.

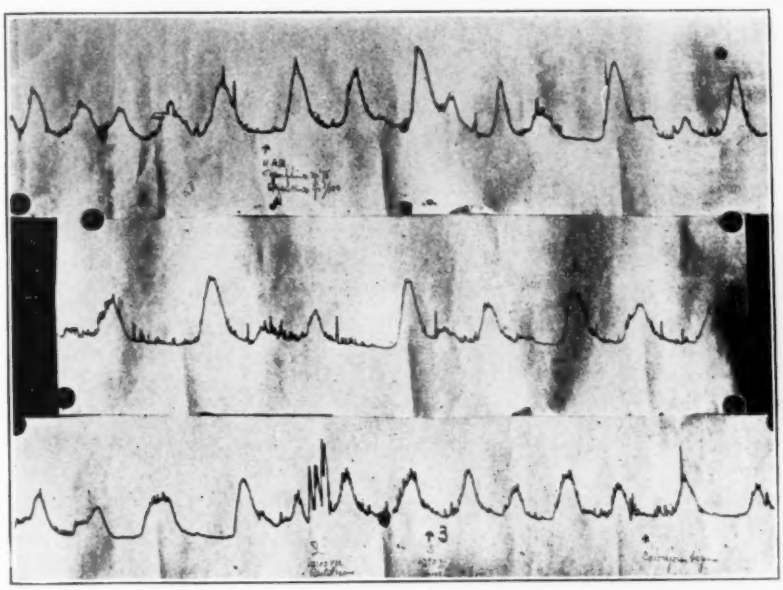


Fig. 2.—Morphine, gr. 1/6 and hyoscine gr. 1/100, were given at point in first line indicated by arrow. Note tendency to reduplication of pains. Chloroform was begun two pains before the record was stopped.

of the time it usually takes to induce labor with a bag, especially before term.

The chief advantage of this method is its simplicity. The introduction of a Voorhees bag within the cervix is often desirable and necessary upon clinical grounds. In order to observe what is taking place within the uterus, the stem of the bag is connected with a mercury manometer instead of clamping or tying it off, as is usually done. The only additional hardship imposed upon the patient is keeping her in bed. She can turn about, sit up, or use a bed pan without interfering with the working of the apparatus. There are some mechanical difficulties with the recording devices. For instance, when I used ink pencils and a continuous roll of paper, I had difficulty in

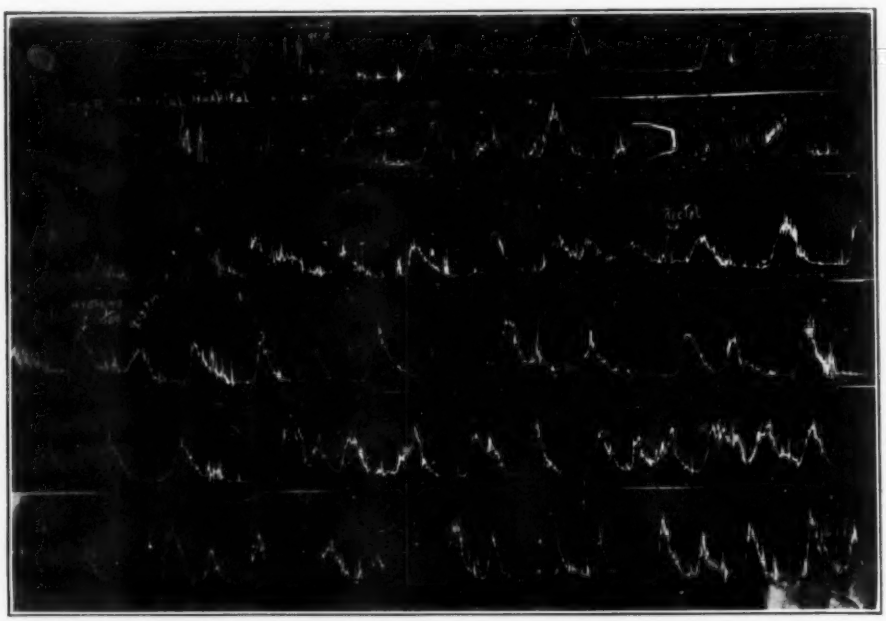


Fig. 3.—Quinine grs. 10, was given by mouth after the third pain of the first line. The effort of raising the shoulders to swallow the capsules shows on the record. There is an interval of 32 minutes between the first and second line, 75 minutes between the second and third, and 20 minutes between the fifth and sixth lines. Notice the relative smoothness of the contraction waves, after 1/100 gr. of hyoscine were given, at the apex of the second pain of the fourth line, and the reduplication of pains in the fifth and sixth lines.

keeping the timer working properly. On the other hand, when I used smoked paper on a long paper kymograph, the changing and smoking of the paper made it necessary that I be near the physiological laboratory.

At first it was thought that the cumbersome recording apparatus might alarm the patients; but, on the contrary, they took great interest in watching the record and in comparing the force of each contraction with the preceding ones.

Although experimental apparatus was used, this work is not ex-

perimental in the same sense that a pharmacologist is able to demonstrate the action of drugs by animal experiments. My work was merely observation with a more or less accurate method of recording the results. In other words, the patients received no different medication than they would have got had there been no recording apparatus. The only exception to this was when pituitrin and ergot were used and then there were extenuating circumstances. For instance, in two cases when a bag was placed on account of placenta previa before the period of viability, pituitrin was used; and once, in a full term multipara, two minims were used about the end of the first stage. Ergotol was used, in small doses, in two cases at term, once by mouth and once hypodermically. The fluid extract of ergot was used in two cases of antepartum bleeding at the sixth and the seventh month respectively.

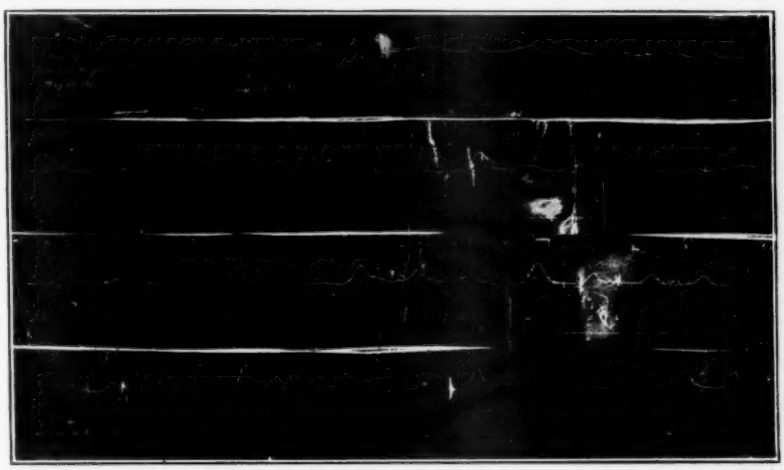


Fig. 4.—Castor oil, two ounces, was given at point *x* on the first line, and quinine, grs. 10, at the point *x* on the fourth line.

Observations were made upon twenty-one patients. Hyoscine was used in ten cases, usually with an initial dose of morphine. Quinine was used in six cases, twice hypodermically and five times by mouth; to one patient it was given both hypodermically and by mouth. Strychnine was used in one case; castor oil in one; ergotol in two cases, and the fluid extract of ergot in two cases. Pituitrin was used in three cases, twice alone and once following hyoscine. Two patients were given first quinine and later hyoscine.

Hyoscine.—There were ten patients in this group with a total of fourteen observations. Seven of these patients were given an initial dose of morphine, either $\frac{1}{6}$ or $\frac{1}{8}$ grain; two patients had quinine previously. Some received scopolamin dissolved in 10 per cent mannite, the so-called "scopolamin, stable," and some received hyoscine or scopolamin in tablet form. I could see no difference in the action

of the two preparations which is in keeping with the accepted views concerning the identity of hyoscine and scopolamin.

As you see from the hysterographs, there is no very marked effect from the administration of either $\frac{1}{200}$ or $\frac{1}{100}$ grain. In some of the patients, who were showing contractions of the voluntary muscles as indicated by the perpendicular lines superimposed on the broader uterine curves, the effect was to diminish these or do away with them entirely, so that the tracing became smoother, showing only uterine contractions and some respiratory waves. In addition to this there seemed to be a tendency towards doubling or reduplicating uterine contractions as if the uterine muscle were more responsive to irritants as the result of the action of the drug. Moreover, by measuring a given number, usually ten, of uterine contractions immediately

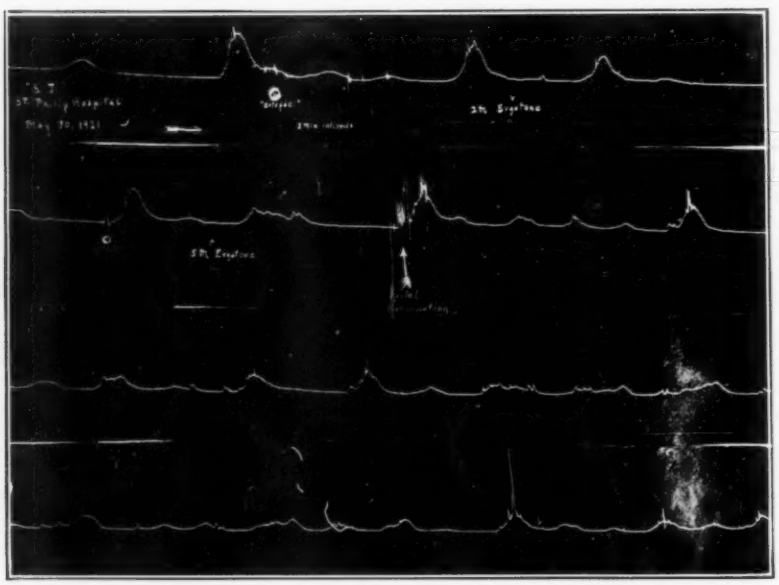


Fig. 5.—Ergotol, two minims, was given hypodermically at point *x* on the first line, and five minims at point *x* on the second line. The irregularities at *O* on the first and second lines are due to tying the stem of the bag tighter.

before and after the hypodermic injection, it is apparent that the hyoscine had a definite, although slight additional effect. In twelve out of the fourteen instances, the height of the contractions was increased, while in two instances it was decreased. One of the patients in which the strength of the contractions was diminished had no preliminary dose of morphine and the diminution of the height of the contractions was due, in part at least, to a cessation of the voluntary efforts on the part of the patient. In nine instances the duration of the pains was increased, in four it was decreased, and in one it was unchanged. The rapidity of the pains is, more or less, dependent

upon the duration of the individual contractions. In nine instances there was a decrease in the rapidity of the pains; once there was no change, and once there was an increase in the rapidity of the pains. In two instances the timer was out of order so that this factor could not be determined accurately. These observations confirm the clinical impression that the first stage of labor is usually shortened by the use of scopolamin or hyoscine.

Quinine.—Six patients fall into this group. One patient was given 3 grains of quinine and urea-hydrobromide hypodermically; one was given four grains hypodermically, and later ten grains of the sulphate

Fig. 6.—Pituitrin, two minims, was given at point indicated by arrow. Labor in this case was induced prematurely. Note that while the action is slight, the uterus does not relax completely for nine minutes.

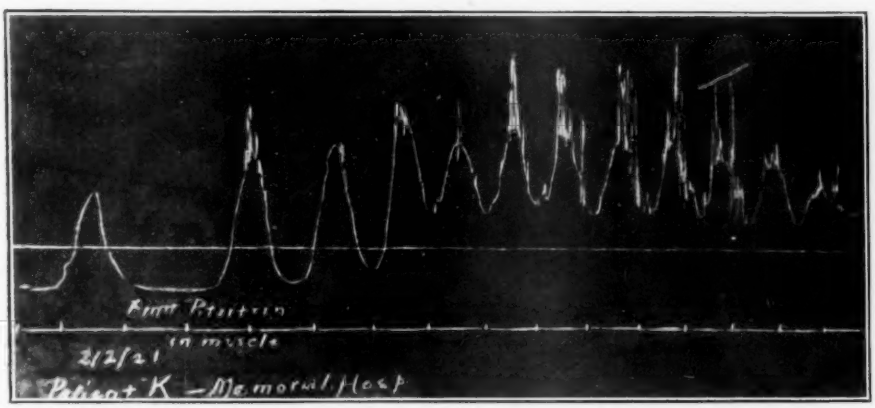


Fig. 7.—Pituitrin, two minims, was given at point *x*. The patient was at term. The uterus remained contracted 28 minutes.

of quinine by mouth; four were given 10 grains of the sulphate orally. Of the two in whom quinine was administered hypodermically, one showed a moderate increase and one a decrease in the height of the contractions. The latter showed an increase in the strength of the pains when quinine was administered orally. The length of the contractions was decreased in both instances after the hypodermic use of quinine, while the rapidity was increased in one and unchanged in another.

When quinine was given orally there was an increase in the strength of contractions four times, once quite marked, and once there was a decrease in the strength of contractions. The duration of the pains

was increased once, unchanged once and decreased three times. The rapidity of contractions was increased twice, unchanged twice, and diminished at once. From this rather limited series it would seem that quinine has, sometimes, a very marked effect in strengthening uterine contractions, but that its action is variable and that occasionally it has no effect. Its action seems to be more potent when given by the mouth than when administered hypodermically.

Strychnine.—In the single instance in which strychnine was used, 1/30 grain hypodermically, there was a moderate increase in both the strength and the duration of the pains.

Castor Oil.—Castor oil was given in one case. After the administration of two ounces orally, there seemed to be no effect on either the strength, the duration, or the rapidity of the pains.

Ergotol.—The baneful effects of the use of ergot preparations before the third stage of labor were so thoroughly drilled into me in my student days, that I hesitated to try it in the first stage. I was, however, so anxious to get a tracing to compare it with some pituitrin records I had made previously, that I, finally, ventured to use minute doses on an unmarried colored girl at term. At first two minims were given hypodermically with no appreciable effect. A five minim dose was then given, and it was followed by a slight increase in the rapidity of the pains with a lessening of their strength and duration. There was no evidence of tetanic contraction, unless the first contraction after the five minim dose be so considered, which seems scarcely justifiable. Another patient at term was given ten minims of ergotol by mouth with no appreciable effect. Of course, negative findings in two cases does not mean that ergotol has no action upon the pregnant uterus. A more plausible explanation of my results, is the inertness of the preparation used.

Ergot.—The fluid extract of ergot was administered to two patients. In both patients bags were placed on account of uterine hemorrhage. One patient was in her sixth month and the other in her seventh month of pregnancy. The latter was given twenty minims orally and later one dram. The former was given a single dose of one dram by mouth. In neither case was there appreciable effect. The same explanation probably holds good here as in the case of ergotol, although the pharmacist insists that I was using the best preparation obtainable.

Pituitary Extract.—The effect of pituitrin in three cases was discussed in a previous paper by Charles C. Haskell and myself;[4] but, as our tracings were not published, I will take the liberty of showing them at this time. In two of these cases labor was induced in the seventh month, while the third was at term. In all three an incomplete tetanus followed promptly upon the administration of from two to seven and one-half minims, occurring in four minutes in the premature cases

and in two minutes in the full term patient. The contraction was maintained nine, thirty-five, and twenty-eight minutes, respectively. The most marked effect followed the use of two minims in the patient at term, although it did not last quite so long as when seven and one-half minims were used in the premature labor.

CONCLUSIONS

The patient with a Voorhees bag in her cervix offers an excellent opportunity to observe the action upon the uterus of the drugs commonly used in obstetrics.

From my limited observations it would seem that hyoscine has a moderate, but rather constant, ecbolic action in the first stage of labor. The action of quinine is more variable; sometimes it markedly strengthens the normal rhythmic contractions and sometimes it shows no action whatever.

My observations upon the action of strychnine, castor oil, ergotol, and the fluid extract of ergot, are too limited to warrant even a tentative conclusion. It would seem, however, that the possibility of an inert preparation of ergotol and the fluid extract of ergot is a real one.

In the three cases in which pituitrin was used, even in minute doses, there was a continued contraction of the uterus that varied from nine to thirty-five minutes in duration. This is probably the explanation of the many disasters that have followed its use.

REFERENCES

(1) Arch f. Gynäk., iii, 1872, p. 58. (2) Arch. f. Gynäk., 1898, lv, 129. (3) Arch. f. Gynäk., 1920, cxii, 459. (4) Jr. Am. Med. Assn., May 21, 1921, lxxvi, 1390.

400 North Lombardy Street. (*For discussion, see page 188.*)

TEN YEARS OF PAINLESS CHILDBIRTH*

By George Clark Mosher, A.M., M.D., F.A.C.S., Kansas City, Mo.

AT THE meeting of the British Medical Association at Birmingham, 1890, I was much impressed by an anecdote related by Alexander Simpson of Edinburgh, nephew of Sir James Y. Simpson, who in a paper on the "Management of Labor," told of a mistake made in the early years of his practice. Called to a woman in labor at some distance from his home, he found the patient having very weak pains and with evidence which he interpreted as indicating a slow delivery. Leaving several pills of ergot with directions to give one every hour until good labor had set in, he remounted his horse and returned home. On changing his clothes for dinner he found on emptying his pockets that the vial supposed to be pills of ergot did not contain ergot but pills of opium instead. Hastily returning to the house of the patient to prevent the giving of more opium he was astonished to find that the woman had fallen into a refreshing sleep after the first pill and, upon awakening, she began good hard pains which soon terminated the case. This experience set him to thinking, and he tried the experiment on subsequent occasions and usually with happy results.

On returning to America on consideration of the subject of the relief of pain in labor it occurred to the writer to try some expedient to accomplish this result since so frequently one is implored by the patient in the agony of her suffering to give her something to relieve her of pain.

To the average man the subject of pain in childbirth is a trivial matter and not longer ago than the present summer distinguished gentlemen, who are obstetricians, went on record as opposed to all drugs in labor.

Dr. Wakefield recently said that "the greatest outrage of modern civilization is the fact that, in spite of all that is recorded in medical literature, the profession and the public remain in silent acquiescence and have no regard for the suffering of women in childbirth, or make any attempt to alleviate this agony."

The twentieth century woman has by education and environment, developed into an extreme type of hypersensitiveness; she is possessed of a nervous system susceptible to impressions and feels pain more acutely; hence her physical and mental forces are easily depleted. The result is, as a general rule, she suffers under ordinary circumstances "a lack of the feeling of well-being which constitutes

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good health." Consequently, when she goes into labor, the modern woman cannot produce efficient efforts, either mental or physical.

Let us consider that 20,000 women annually die from childbirth in the United States, that hundreds of thousands more are incapacitated by invalidism due to the same causes. A melancholy picture! In the chairman's address in the Section on Obstetrics of the American Medical Association, Dr. John O. Polak, 1920, disclosed the fact that the death rate in obstetrics has increased from 1901 to 1919 and this in spite of all improved hospital technic. This fact must be recognized as a reflection on the general care of women in labor. The statistics of the hospitals bear out this conclusion. As both morbidity and mortality in hospital cases are lessened, we must in some way improve the method of obstetric care of the average woman in the home to lower the mortality rate of the country at large.

In what particular is this easier than to increase her own immunity by conservation of her reserve, simply by lessening pain, fatigue, shock and exhaustion?

The effect of suffering in labor demoralizes the nervous and vital forces to such a degree that it demands recognition and cooperation.

When one studies the statistics of the alarming decrease in the size of the families in this country in the last 40 years and the alarming increase in abortion, as shown by Arthur E. Meyer in the August number of this journal, we must conclude that some reason exists for the desire to escape maternity on the part of the American women. The maternal instinct is strong in the normal woman, and there is a reason for the record of our childless homes, aside from the oft quoted "high cost of living." Every family indulges in luxuries, and even if babies were to be classed among the articles subject to war tax, people would not reject them simply because of the cost. The great bugaboo of the young wife is the fear of the suffering she must endure in giving birth to a child.

What a pity that motherhood, which is the most beautiful relation in life, should be attended by physical suffering and mental terror, when this condition may be avoided by a safe and comparatively simple method of treatment. If we are able to give assurance that pain can be lessened or prevented by any combination of drugs, which may be used without injury, we bestow a boon on our patient; we gain her confidence; later, gratitude follows her having gone through the valley of the shadow without a memory of any disturbing character.

It is but fair to state, at the outset, that the views following are based on my own experience and where they differ from those of other men, they are to be taken as drawn from cases in our own clinic.

Various methods of combination of drugs have been devised by the few investigators interested in the study of relief of pain; some of

these having value, others being without virtue. As observation of one or another of these plans demonstrates to us its weak points, it has been dropped after more or less trial. For example, the tablet of hyoscine-morphine-eactin, which, after a vogue of several years has fallen into disuse, was early discovered to profoundly affect the child, and that in a most dangerous manner. This we at once discarded after a single trial. The deep narcosis of all large doses of morphine and hyoscine, or morphine and atropin was subject to the same serious objection. Scopolamin and morphine we first used in 1911, and we feel it met the indication; but the objections to it on the part of the profession have been so general, that it but slowly came into any considerable favor. It must be remembered that profound narcosis will, in greater or less degree, prevent uterine contractions, hence it is not possible to prevent pain absolutely and continuously throughout the labor.

Gauss early showed that there is a point in amnesia which falls between a simple temporary relief from pain, and absolute narcosis. This happy medium has been graphically styled, "Twilight Sleep." This term has been the subject of much opprobrium because it was formerly exploited in a popular way in articles printed in magazines for consumption by the lay public.

I believe the specific effect of the administration of scopolamin is of the greatest benefit in women of the highly organized nervous system of the cultured class. But in our experience the point at which this condition of amnesia appears is vastly different in different individuals, and must, therefore, correspond to the individual sensibility in order to avoid overdosing or fail, because of too small an amount being administered. In this individualization, as demonstrated in our own cases with the same results that have been conclusively shown by Dr. Gauss, the undesirable effect of extreme pain on the one hand, and deep narcosis on the other, are overcome.

The technic proposed by Siegel, of experimental fixed dosage, resulted in undesirable developments which I had already encountered in our early attempts to establish a fixed dosage for all patients. The sensibility of the patient is the only measure of the degree of narcosis and this can be ascertained only by observation of each patient as to the results of her treatment. If Siegel's method of the so-called "simplified amnesia" could be followed, the personal equation might be eliminated, and the care of the patient left to an intelligent nurse, except at the time of delivery; and one of the chief objections to scopolamin—the demand on the time of the physician—be thus removed. Siegel changed his technic three times; but in each method the large initial dose of scopolamin and repeated doses of narcophin of generous amount, was, to our mind, a fatal mistake. Siegel, also,

in his last series, used amnesin, a combination of quinine with narcophin, for the purpose of stimulating the labor pains which are, admittedly, reduced by the large doses of scopolamin and morphine. Whether quinine will be effectual in combination with an opiate, in overcoming the reduction of the expulsive force of labor, is a question. In the individualized method this "amnesin" is unnecessary. I am not yet ready to report whether quinine will be helpful in overcoming the occasional state of excitement due to the scopolamin.

In a most elaborate study of the opium alkaloids by Dr. D. I. Macht, of the Department of Pharmacology of Johns Hopkins, as reported in the Journal of the American Medical Association and the American Journal of Medical Sciences, he demonstrates that pantopon (pantopon hydrochlorate first devised by Sahli, at the University of Zurich, 1909, which includes the chlorides of the total alkaloids of opium) acts as a stimulant to the respiratory center, and thereby obviates the objection to which morphine has been subject. All of the criticism to the use of scopolamin and morphine in labor is centered on the fetal asphyxia which followed the use of this combination in the former dosage.

The comparison of Sahli's mixture of the total alkaloids, with the administration of morphine alone, shows a remarkable result; two mgs. of morphine completely paralyzed the respiratory center in a rabbit weighing 1000 grams, while in a rabbit weighing 900 grams after 14 mgs. of the total alkaloids of pantopon, equal to 7 mgs. of anhydrous morphine, the rabbit still responded to inhalations of CO_2. Sahli's mixture of opium has the experimental value of being safe to be used in several times the amount of morphine that could be tolerated alone, and the result is more prompt and efficient; also being much less depressant. For several years it has been recognized that the great objection to morphine is the depressant sedative effect on the respiratory center. Codein, though to a less degree, has the same general effect.

The accumulation of morphine is, in our opinion, the greatest menace to the life of the fetus, as it has been shown that, while scopolamin passing into the body of the child is eliminated by the urine in twenty minutes, morphine is not so easily eliminated. We have, therefore, following these experimental discoveries coincident with our own clinical experience, in the great majority of cases, discontinued the morphine entirely, as we believe the great danger of the combination is in the use of this opiate, and morphine has practically been abandoned in favor of pantopon in our work.

We find that the other objections to morphine, nausea, vomiting, constipation, suppression of urine, and distention, are less pronounced after pantopon than morphine. However, after some experience in administration we have in our later work found it has been unnecessary

to use even with the initial dose of scopolamin in many cases the pantopon. For many years we have used no opiate after the first dose. Of course, the individual cases where pantopon can be eliminated are carefully selected, the equable stable mental organization inviting the use of scopolamin alone, as these patients bear pain and respond without the necessity of the sedative before the analgesia. In other words, our personal experience has induced changes in the original detail of the administration of scopolamin, as observation demonstrates how the individual patient must be treated, rather that a fixed dose should be given to each patient, as suggested by Siegel in his experimental system, styled "the simplified method."

The question of the length of labor under scopolamin we have settled to our own satisfaction. We find that the first stage is less than in cases without the injection. The softening of the cervix in primiparae proceeds more readily than in other cases where it is not used. And this is one of the most grateful of the benefits resulting. In the second stage the duration is slightly lengthened. The average duration of labor in these cases is 10 hours and 49 minutes; in primiparae 13 hours and 20 minutes; in multigravida 7 hours 10 minutes.

We have frequently found the expulsion of the fetus expedited by ⅓ ampule of pituitrin hypodermically administered in those cases where delay is met as the head reaches the perineum and a degree of inertia prevents the forward movement of the child. The necessity for an increase in the use of forceps, is acknowledged; but with full dilatation and the head on the perineum, no harm can result from skillful application of forceps; proper care being observed to do extraction between pains, to remove forceps before the head is entirely extruded, and by pressure from below in the anal region to push the head gently through the outlet. The third stage of labor is somewhat prolonged, doubtless due to reaction after the relief from the burden of the labor ending with the expulsion of the child.

We are now trying out the procedure of giving ½ c.c. of pituitrin immediately following the expulsion of the fetus as a means of expediting the delivery of the placenta. Much of the shock, experienced in labor, is due to hurrying the placental stage before the afterbirth separates from its site in the uterine wall. As an index we clamp the cord with a hemostat at the vulva, the suggestion of Tweedy, and await the dropping of this barometer two and one-half inches before making any effort to expel the placenta. Our invariable rule is to avoid traction upon the cord, or the misapplied Credé of violent pushing against the abdomen to express the placenta.

In 1820 Charles D. Meigs said, "Show me a case of postpartum hemorrhage and I will show you a case of mismanagement of the third stage of labor." After a hundred years we are inclined to vote with

Meigs on this conclusion. At any rate, waiting for the placenta to be at the outlet, will, in the average case, diminish the tendency to postpartum shock, as well as postpartum hemorrhage. Our custom is to have the patient closely watched for two hours, cautioning the nurse as to rapid pulse, abdominal distention and free hemorrhage. We have no more tendency to hemorrhage in scopolamin cases than in those where it is not used.

All of our patients are delivered in the hospital, so that there has been no opportunity to compare the results of hospital managed cases with those confined at home. However, as there is an admitted psychic element in the success of the treatment, it would seem that an attempt to utilize this method in the bedroom of the patient at home might be disappointing, as she will be subject to disturbances from her environment. Ideal conditions in the hospital must be insured, such as absolute quiet in the delivery room and vigilant supervision on the part of the attendant. Cotton in the ears includes both suggestion and some degree of preventing disturbance by outside sounds. Since the patient in complete amnesia is likely to be unaware of the progress of the delivery, she must be watched for precipitate delivery, which is liable to occur if there is neglect of this precaution.

I believe much of the success of our method is due to using a reliable stable solution in ampules instead of the ordinary hypodermic tablet of commerce. Formerly we used a $\frac{1}{100}$ grain dose; but more recently we have depended on the $\frac{1}{200}$ grain ampule alone. Our average case has had $3\frac{1}{2}$ ampules, the largest number 12 ampules; 12 per cent of our cases have had but one ampule. Cases delivered within two hours do not respond to scopolamin and these rapid deliveries are done under ether alone, if sufficient evidence is found to base an estimate of the probable length of the labor.

Since a large number of our cases are referred, and many of these are toxemic, we have not used the gas-oxygen anesthesia. Dr. Edward P. Davis, and other observers, believe this combination of anesthesia to be dangerous in cases of maternal toxemia. While many reports are given of admirable results from those clinics where gas is used, our results have not tempted us to change our method of amnesia.

The great aim in better obstetrics is twofold; it concerns mother and child, both as to morbidity and mortality. Fortunately, the interests of the two are most frequently identical, the argument as to the mother, I have attempted to make clear. As to the child, a glance at the comparative statistics must prove conclusive, as they are most striking. Williams, of Johns Hopkins, reports a fetal mortality of 7 per cent, and Slemmons, in California, had 5 per cent, which is about the average infant death rate. Gauss, at the Freiburg Clinic, has in his last report of 500 scopolamin cases a fetal mortality of 1.89 per cent,

and Polak, Brooklyn, in a series of 500 cases, reported a mortality of 4 infants, or less than 1 per cent. We have had no fetal death that could be charged to the scopolamin treatment. The fetal mortality from all causes in our last 500 cases, excluding prematurity, is 2.8 per cent. In contrast to our former experience is the fact that it has not been found necessary to tub a single scopolamin baby. Some children show an oligopnea; but none of the last series had apnea, and there were none that did not recover the respiratory rhythm after a few minutes, without more effort than allowing the mucus to be expelled from the mouth by suspending the child by the feet for a few minutes. We have, of course, no maternal mortality chargeable to scopolamin.

While no one can say what might have been the result in any case had the patient not been given scopolamin, we can only judge of the results in the aggregate of experiences compared with those delivered with this method, and those under other conditions. For instance, take the problem of occiput posterior positions of the vertex with which, unfortunately, all obstetricians are familiar. It is an axiom that given plenty of time, over 90 per cent of these cases will rotate spontaneously to an occipito anterior position; but, who has not made out the position without examination under these circumstances, by the incessant appeals for relief of pain in the back; the patient, finally, becoming exhausted by the long and tedious process of labor. These cases are admirably met by scopolamin, and the average patient comes through with a pulse under 100, and in a few hours recovers sufficiently to be asking for food.

It is only necessary to compare our experience in these cases alone, to be able to draw conclusions as to the degree of exhaustion suffered in cases with and without scopolamin. By and large our patients average a shorter convalescence and we are able to send them home earlier than under the old methods. Even in our City Hospital cases, although scopolamin has not been so satisfactory, we long ago abandoned any set day of convalescence as an indication of discharge, each woman being dismissed when the fundus of the uterus is at the symphysis and the lochia, for 48 hours, has shown no red color. In some patients this will be as early as the eighth day; ordinarily the average is the twelfth, instead of the fourteenth day, as formerly.

We find scopolamin to be of value in heart conditions, toxemia, rigid cervix, and contracted pelvis of minor degree; as the relief from agonizing pain allows for a lessening of the tension, both physical and mental, the patient recuperates for the further effort she must make for her delivery. The result is that shock is diminished, the head is more easily moulded, and the tendency to perineal laceration is diminished.

The claim that scopolamin produces a better milk supply, we have

not been able to substantiate. On general principles, the less exhausted the mother the better her nursing capacity; but the question of any specific relation is still open, and must be determined by further investigation.

It is a matter of interest that in so large a degree, even the men who have not been favorably disposed toward scopolamin as an amnesic in their work, have used morphine and hyoscin, or morphine and atropin, or morphine and scopolamin, as an analgesic antecedent to an inhalation anesthetic. Various observers report between 50 and 70 per cent of perfect amnesia. In 70 per cent of our patients we have had complete amnesia. The outstanding fact, claimed by Crile, in his anoci-association in general surgery, is that, in a sense, the area of nervous irritability is blocked and the agonizing pain of the patient is thus relieved. This is the secret of the amnesia of scopolamin.

CONCLUSIONS

1. Scopolamin is both safe and efficient if intelligently managed.

2. In primiparae it is invaluable, as the moulding and rotation of the head are encouraged by its influence.

3. The technic of Gauss must be followed to insure the greatest measure of success, rather than the "simplified method" of Siegel.

4. A shortening of the time in the first stage of labor results.

5. The second stage is doubtless somewhat extended. The forceps or pituitrin may be needed at the end of the second stage of labor.

6. Patients must be constantly watched for precipitate delivery.

7. No increase in postpartum hemorrhage has occurred in our cases.

8. Shock and fatigue are diminished.

9. Perineal lacerations are greatly reduced in degree and in frequency.

10. Fetal mortality is lessened.

11. Lactation is not affected.

12. Mothers are up earlier and in more nearly physiologic convalescence than in our cases where scopolamin was not used.

605 Bryant Building.

(*For discussion, see page 188.*)

AN ANALYSIS OF THE POTTER VERSION*

By Edward Speidel, M.D., Louisville, Ky.

IT IS not necessary to explain to the members of this Association or to any one who has kept in touch with obstetric literature, what is meant by the Potter method of version. Presented for the first time five years ago, and followed up each year with an additional paper on the same method, Dr. Potter has had the gratification of seeing intense antagonism and resentment change to unqualified admiration.

Potter presented his version as a method of delivery to be used practically in all cases, with the idea of relieving the parturient woman of the discomforts and delays of the second stage of labor. He presents no indications or contraindications for the use of the version and, consequently, leaves no opening for a discussion on that point.

Having had the pleasure of a visit with Dr. Potter in Buffalo, and from a limited experience with his method in private and hospital practice, the writer would like to discuss the version from three distinct points of excellence.

First: It is such a decided improvement over all the old established procedures that it should supplant every other method of performing podalic version. Second: The delivery of the child after the version has been performed is such a marked advance over the old methods of breech delivery that it should displace that practice at once. Third: His effective treatment of the child at birth by gentle rational manipulations, is so superior to the many rough treatments to which the asphyxiated baby has been subjected heretofore, that it should induce every obstetrician to emulate them.

The writer wishes accordingly to discuss the method from these standpoints without endorsing the object for which the author presents it.

The Potter method of version, fortunately, is not solely a hospital procedure. It is easier than the older method and can be readily performed by any one at all competent to do a version. A person with a small hand is by nature especially qualified to do a version. It can be performed in the humblest home. In fact the ordinary kitchen table makes the most ideal operating table for any of the ordinary obstetric operations. The patient's head is at one end of the table convenient for the anesthetist, while the hips are at the other end with the legs upon two chairs in the modified Walcher position, which

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is a feature of the technic. This position as is well known increases the true conjugate diameter about 1 cm. The vaginal outlet is drawn so far down that the angle, formed by the long axis of the uterus with that of the vagina, is diminished and the uterovaginal canal becomes less curved, approaching more a straight line and making delivery much easier. It also relaxes the perineum and so lessens the liability to laceration of that structure. This position is superior to the lithotomy position as it relieves the patient of the intense backache that often follows vaginal operations when the legs have been held up, in an unnatural manner, for some time, with the lumbar spinal curve unsupported and the patient resting upon the sacrum with the weight of the two legs superimposed. It might be worth while to try this Walcher position in some of our gynecologic operations.

It is very essential that the cervix be fully dilated and, in primiparae, Potter not only waits for full dilatation but seems to prefer partial descent of the presenting part before proceeding with his version. I venture to say that he avoids manual dilatation in primiparae if possible. In normal dilatation the cervix stretches and retracts with each pain so that, when full dilatation is attained, the cervix is obliterated. In manual dilatation the cervical tissues are simply stretched to the sides of the pelvis; there is no thinning out or retraction, and this is the cervix that catches the neck of the fetus at the crucial point of the delivery and nullifies the object of the version.

Potter prefers chloroform as the anesthetic. Many of us who remember the period of twenty-five years and more ago, when chloroform was used almost exclusively in the south, and one ounce of this drug would hold a patient in deep anesthesia for an hour or more, cannot help wondering whether an inhalation of ½ pint or more of ether into the lungs is not more dangerous than the use of chloroform despite the findings of the anesthesia commission, that is supposed to have settled the question.

The patient is prepared as for a surgical operation, catheterized, shaved, and the parts cleansed externally with soap and water. Potter makes no mention of vaginal cleansing. Here I would like to present my own method of preparation, which I have always used in my obstetric operations. The vagina cannot be rendered sterile by letting a thin stream of bichloride or lysol solution trickle down its walls. Instead the gloved right hand of the operator holding a piece of gauze, saturated with green soap, should be used to thoroughly scrub the vagina and cervix, and this should be followed by a copious irrigation with sterile water.

In Potter's technic the right hand is not used internally throughout the precedure, consequently, it cannot contaminate the field after this preliminary cleansing. The left hand, covered with an elbow-

length rubber glove, is well lubricated with green soap and introduced into the vagina. Green soap is an ideal lubricant for these passages as it is easily washed away by the secretions that pass out during and after the version. Vaseline, which is generally used for this purpose, clings to the tissues and forms the best kind of an embedding material for microorganisms.

Potter then proceeds to iron out the vagina and distends it for easy delivery of the after-coming head. His method consists in pressing downward and backward on the posterior vaginal wall from the cervix to the introitus, first with one finger, then with two, three and finally four fingers, and seems to be an advance over that advocated by Edgar, in which the fingers are inserted into the vagina to make traction on the muscular sling of the perineum for the same purpose. The left hand is then introduced through the dilated cervix, between the unruptured membranes and the uterine wall to the fundus and gently swept around in all directions, avoiding the placental site.

This maneuver is similar to the practice in cesarean section and facilitates the delivery of the placenta. The bag of waters is so elastic and the uterus so relaxed under surgical anesthesia, that the fetal parts can be readily palpated and the location of the legs determined before rupturing the membranes. By palpating the neck of the fetus one can also determine whether it is encircled by the cord. The distinctive feature of the version proper now seems to be in no wise to disturb the relation of the fetal parts before the version is completed. In this way one avoids pressure upon and entanglements of the cord, undoubtedly the most disturbing factor in determining the favorable or unfavorable outcome of a version.

Potter performs all of his versions with his left hand. It is reasonable to suppose that others, not as dexterous, might perform the operation with either hand encased in elbow length gloves and, in performing the version, follow the old rule of using the hand so that the palmer surface of it will come in apposition to the abdomen of the child. At this juncture a towel is wrapped around the left arm of the operator to absorb the liquor amnii, that gushes out with the rupture of the membranes. It seems best to break through the membranes high up near the fundus and then slide the hand down the thighs of the fetus until the feet are reached. Gentle traction, with pressure on the head in the opposite direction, will aid in readily bringing both feet out of the vagina and completing the version.

It will be remembered that in the older methods it was always demanded that only one leg be brought through the cervix, in order that a wider surface be left to dilate the cervix. The facility with which delivery can be effected when both feet are brought down shows that the older procedure was faulty. The idea that a version is dan-

gerous if some time has passed since the rupture of the membranes and, especially, if the head has descended into the pelvis, does not hold good. The experienced obstetrician finds the uterus so relaxed and elastic under full surgical anesthesia that the head can be readily pushed up and the hand introduced for a version.

Only recently I performed a version in a head presentation bringing down both feet readily more than twenty-four hours after rupture of the bag of waters had taken place. With both feet protruding from the vagina, the final step in the procedure resolves itself into the delivery of a breech presentation. It is but fair to state that in the past, everyone has dreaded the delivery of the arms and after-coming head by the method in vogue up to recent times. The method described by Potter is so superior in every respect, that it should remove every dread of breech delivery. One need have but little trouble with the delivery of the after-coming arms, shoulders and head.

Potter makes gentle traction on the legs of the fetus, turning the back of the child up until the scapulae appear at the vulva. Then he slips a finger along the shoulder under the symphysis pubis and delivers the anterior arm. He then turns the body of the child in such a way that the posterior arm comes to rest under the symphysis pubis and delivers it in the same manner as the first shoulder. In all of my cases after delivery of the anterior arm, the posterior arm slipped out without any difficulty.

The crowning feature of the version is the delivery of the after-coming head. It is far superior to the Smellie-Veit method and is dependent solely upon the manipulations by the operator. Potter advises against following down the fundus during the delivery; because, he claims, one creates the very condition that we seek to prevent. By pushing down on the head it sinks between the shoulders and the arms go up. Whether Potter is correct in his view, I am not prepared to say. In all of my cases the arms seemed to have been carried upward, more or less, but this made not a particle of difference in the ease of delivery.

Potter delivers the head by inserting two fingers of the left hand into the baby's mouth, the body riding astride of his left arm and then, with the right hand resting upon a sterile towel, suprapubic pressure is made downward and backward until the face distends the vulva. The feet of the child are now held high up and its throat stroked to empty the trachea, and, in many instances, the fetus will begin to breathe while in this position.

There should be no haste in forcing out the rest of the head. Instead, it may be allowed to dilate the perineum and with the ironing-out of the vagina, practiced before beginning the version, many deliveries will be completed without a laceration. Potter shows no hurry

in the delivery of the child for fear of having an asphyxiated infant; and after the birth of blue babies, he quietly places them on their right side on the abdomen of the mother and allows respiration to start spontaneously. This position, of course, favors the closure of the foramen ovale. The umbilical cord is not tied until pulsation stops.

It will be remembered that the venous circulation in the cord ceases very shortly after birth in consequence of the contraction of the umbilical arteries; but the arterial circulation in the umbilical vein continues for from five to fifteen minutes adding, at least, an ounce of blood to the fetal circulation and supporting the heart of the fetus until respiration is established. It may be assumed that this is an important feature in the resuscitation.

Success seems to follow this gentle method in nearly every instance; that has been my experience. Potter's statistics show the same result. This goes to show that we can discard many of the rather rough manipulations that were practiced in the resuscitation of asphyxiated babies, without impairing our results.

In a discussion of this mode of the delivery, with Halstead of New York, it was suggested that the body of the child be allowed to come down, naturally, with the shoulders descending in the left oblique diameter at the superior strait until the scapulae appear at the vulva, then to rotate the anterior shoulder under the symphysis pubis and deliver as such. In order not to disturb the relation of the fetal parts, the posterior shoulder should then be lifted over the perineum. Theoretically, this should then leave the after-coming head in the right oblique diameter of the superior strait, consequently, the easiest delivery should be, downward pressure on the fundus with the head held in this diameter until the fingers in the baby's mouth press firmly upon the perineum, then rotation forward under the symphysis and the delivery completed as described by Potter. Potter with his enormous opportunities can quickly determine whether there is anything of value in these suggestions.

An ampule of pituitrin is injected as soon as the baby is born and serves to expedite the delivery of the placenta. It may be assumed that a uterus emptied by version, in ten to fifteen minutes, is more liable to sudden relaxation and postpartum hemorrhage than one that has emptied its contents by rhythmic contractions for an hour or more. Furthermore about 2⅓ ounces of blood are saved the mother, as has been determined by Ryder at the Sloane Hospital for Women in one hundred cases treated with pituitrin, in the third stage of labor.

With the experience gained through the Potter version the writer has solved the delivery of breech presentations for himself as follows: With full dilatation in a frank or complete breech or footling presenta-

tion, full surgical anesthesia, iron out the perineum, bring down both feet, and complete the delivery according to the Potter procedure.

Potter does not state his fetal mortality in normal cases in which he has used his version solely for the purpose of relieving the patient of the discomforts of the second stage of labor. It is surely essential that those desiring to follow that indication for the use of this version should know this.

The writer has found the version of special service in cases with apparently normal diameters but a lack of progress in labor in spite of good pains. In such instances there is generally found premature ossification and, in consequence, nonmolding of the fetal head or an overdeveloped fetal head.

Only recently the writer delivered a woman, weighing 94 pounds, of a 9½ pound baby by the Potter version, without laceration of the soft parts, after a two hour ineffective second stage of labor.

THE FRANCIS BUILDING. *(For discussion, see p. 189.)*

TREATMENT OF ECLAMPSIA; THEN AND NOW*

BY JOHN F. MORAN, M.D., WASHINGTON, D. C.

ECLAMPSIA and infection are the two great scourges of pregnancy, parturition, and the puerperium. While the latter, through the introduction of asepsis, has been robbed of much of its terror and placed well within the limits of prevention, the former, because of insufficient knowledge concerning its etiology and origin, is still involved in hypothesis and theory; its treatment largely empirical and its morbidity and mortality high. Much important work, however, has been accomplished in recent years, particularly, in its pathology, which, in supporting the toxic theory, is thus contributing to a more comprehensive knowledge of the disease. That various toxemias affect alike the pregnant and nonpregnant is obvious; but the trend of opinion favors the belief that there are one or more varieties dependent on the gravid state which are, probably, the underlying causes of eclampsia, hyperemesis gravidarum, acute yellow atrophy of the liver, and many of the minor ailments and psychoses of pregnancy.

Conformable to the various views held as to the origin of eclampsia, different methods of treatment have been resorted to; but the results have remained as uncertain as the theoretic foundations on which the methods have been based. So that, at the present time, we are, unfortunately, without a rational treatment with which to combat this

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dangerous complication of pregnancy; and, in the presence of severe types of the disease, are well nigh helpless. The graver forms comprise from 3 to 5 per cent of the cases in general; they are more frequent at different periods of gestation, and they may appear in groups. These malignant cases are frequently attended with few convulsions, coma quickly supervening after the first seizure, accompanied by fever, jaundice, hemoglobinuria, or a complete suppression of urine. They are rapidly fatal.

When the writer graduated in the late eighties, the treatment included both conservative and forcible measures. The former embraced sedatives, bleeding, veratrum viride, chloroform, and elimination by purgatives and sweating; while the latter consisted of forcible dilatation of the os, or, to speak more correctly, divulsion of the cervix and the termination of the delivery of the child with forceps or version. At this time aseptic surgery was developing; its increasing brilliant results, quite naturally, brought it into competition with the conservative treatment and accouchement forcé of eclampsia. In the late nineties we were performing immediate deliveries in eclampsia by abdominal cesarean section, as recommended by Halbertsma, and later by vaginal cesarean section, as advocated by Dührssen. These operations are favored today by surgeons; but there is a growing reaction among obstetricians against such radical treatment, and obstetricians are now more in favor of medical and obstetric measures, except in cases complicated by rigid cervix, aged primiparae, contracted pelvis, or marked disproportion between the child and the mother's pelvis.

Formerly I was rightly classed as an "interventionist," being rather in favor of the cutting operations. Impressed, however, by the kindly and earnest criticism of your esteemed secretary, Dr. Zinke, who dissented from my advocacy of cesarean section in favor of the conservative treatment, I was prompted to review my surgical cases and became satisfied that some of them would have yielded favorably to more conservative measures. I have, therefore, for several years adopted a more conservative course by individualizing my cases and resorting to active, medical, or combined treatment as, in my judgment, the exigencies of the case may demand.

I wish now to invite your attention to a series of pre-eclamptic and eclamptic cases attended in consultation and in the hospital during the past four years.

The method followed is to give morphia hypodermically at reasonable intervals to reduce the respiratory movements to ten or twelve per minute; bleed, when the blood pressure is high, to reduce to 150, or thereabouts; wash out the stomach, leaving in two ounces of castor oil, irrigate the bowels and follow this with five per cent glucose and soda solution

by the drip method. We feel that this method is very helpful even if, for any reason, we find it necessary to intervene surgically. In the latter emergency we would be guided by the condition of the cervix and menacing conditions as to which operation we would elect.

PRE-ECLAMPTIC TOXEMIA

CASE 1.—Mrs. S., multipara, white, aged thirty-eight. Admitted to Georgetown University Hospital. At term, headache, amaurosis, ptosis of right eyelid, blood pressure 210-132. Bag introduced. Living baby, weight, 11 pounds. Mother and child discharged in good condition.

CASE 2.—Mrs. K., white, multipara, eight months' gestation; marked toxic symptoms persisted in spite of rest, diet, etc. Blood pressure, 195. Two examinations by ophthalmologist at interval of a week; first examination negative; second, positive for retinitis. Sent to Georgetown University Hospital. Labor induced with bag. Puerperium normal. Mother and child all right.

CASE 3.—Mrs. L., white, aged thirty-seven, 4-para, seven months' gestation. Seen in consultation at Georgetown University Hospital, October 9, 1920. Patient blind and in coma. Vomiting. Treatment: Venesection, 500 c.c., replacement, glucose and soda solution. Bag inserted, but it was ineffectual. Meanwhile coma lifted and patient became rational. Labor spontaneous, complicated by prolapsed cord and transverse presentation. Version. The child succumbed prior to delivery. Mother developed pleurisy on right side. She was aspirated and made a good recovery.

CASE 4.—Mrs. H., white, aged twenty-nine, 2-para, eight months' gestation, seen in consultation, headache, insomnia, general edema, blood pressure 165-128. Removed to hospital and labor induced. Result satisfactory. Mother and child living.

ECLAMPSIA

CASE 1.—Mrs. M., white, aged nineteen, primipara, at term. Seen in consultation at Providence Hospital, June 20, 1917. In labor 24 hours. Five convulsions, morphinized, mid-forceps delivery. Mother and child living. Two births since, both normal.

CASE 2.—Mrs. K., white, primipara, at term. Seen in consultation; pre-eclamptic; had convulsion during second stage of labor; mid-forceps delivery. Mother and child living.

CASE 3.—Mrs. B., white, aged forty, primipara, at term. Seen in consultation January 26, 1917. Patient very toxic, cannot see and is markedly edematous. Advised removal to hospital at once. While being prepared for operation she had a convulsion. Cesarean section was performed shortly after admission to Columbia Hospital. Four convulsions during the following thirty-six hours, after which she regained consciousness. Mother and child living.

CASE 4.—Mrs. G., white, aged thirty-three, primipara. Seen in consultation. Admitted to Georgetown University Hospital after having had several convulsions. Coma profound, cervix intact. She was bled and morphinized; but, as the convulsions recurred together with almost complete suppression of urine, cesarean section was performed. Child weighed 6.5 pounds; lived several hours. Patient had six convulsions in the hospital; three after the operation. Recovery uneventful. She was delivered of a second child March 11, 1919. Natural labor.

CASE 5.—B. C., colored, aged twenty-five, primipara. Ward patient. Admitted to Columbia Hospital in labor with history of two convulsions, and that she had been blind a week. Marked edema. Blood pressure 180-118. Treatment: Morphinized,

and labor induced with bag. Patient regained consciousness before delivery. Child stillborn, due to tetanic contraction of the uterus. Mother made uneventful recovery.

CASE 6.—Mrs. L., white, aged eighteen, secundipara. Admitted to Georgetown University Hospital, July 7, 1918, having had six convulsions before admission. Marked edema, cervix intact, not in labor. Blood pressure, 210-132. Venesection, 20 ounces. Morphinized. Convulsions recurring and coma deepening, cesarean section was performed by associate, Dr. Lowe. Living child, at term, delivered. Five convulsions after operation. Patient rational on second day after labor. Mother and child discharged in good condition.

CASE 7.—Mrs. M., white, aged twenty, primipara. Private patient. Sent to Georgetown University Hospital in labor. Protracted first stage due to premature rupture of waters. When head was on perineum patient had a convulsion. Delivered with forceps. Mother and child living. Second birth, January, 1920. Pregnancy and labor normal.

CASE 8.—Mrs. S., white, aged twenty-three, primipara, postpartum eclampsia. Admitted to Georgetown University Hospital, in labor, May 20, 1918. First convulsion fourteen hours after delivery; three seizures in all. Bled 18 ounces, and morphia was given. Mother and child living.

CASE 9.—Mrs. T., colored, aged forty-three, multipara. Admitted to Georgetown University Hospital, June 4, 1918, with history of convulsions and in profound coma. Marked edema. Blood pressure, 248-150. Bag introduced and venesection done. Owing to deep coma no sedative was given. Stillbirth. Patient left hospital in very good condition.

CASE 10.—Mrs. K., white, aged twenty-three, secundipara. Admitted to Georgetown University Hospital, March 15, 1918. Seven convulsions, edema and impaired vision. Blood pressure, 144-84. Morphine. Venesection; 1000 c.c. removed. Labor induced with bag. Child premature, lived 7 hours. Mother's recovery uneventful.

CASE 11.—Mrs. B., white, aged twenty-three, primipara. Admitted to Columbia Hospital, August 4, 1919, in coma having had three convulsions. Blood pressure, 145. Venesection, 500 c.c. Morphinized. Bougie inserted. Delivery following day. Premature child, seven months; lived seven hours. Mother living. Again pregnant. Eyes, kidneys, and blood pressure normal.

CASE 12.—Mrs. N., white, secundipara. Admitted to Columbia Hospital, August 8, 1919. Urine contains albumin and casts. Blood pressure, 198-104. Had convulsion at beginning of labor. Morphinized. Venesection, 22 ounces. Natural delivery. Stillbirth. Patient developed aspiration pneumonia, but recovered and left hospital, still anemic, but improving.

CASE 13.—Mrs. W., white, aged thirty, primipara. Seen in consultation at Georgetown University Hospital, July 31, 1918. Not in labor. Blood pressure, 142-92. Four convulsions. Morphinized. Venesection, 500 c.c. Following day, rational. Labor did not supervene for six days. Delivery natural. Mother and child living.

CASE 14.—Cr., colored, multipara. Admitted to Columbia Hospital. History of convulsions before admission; marked edema of body and vulva. Bled and morphinized. Regained consciousness and did not go into labor until three days later. Meanwhile the vulva was scarified and edema rapidly subsided. Labor and puerperium uneventful. Mother and child living.

CASE 15.—C., colored, multipara. Admitted to Georgetown University Hospital, December 9, 1919. Four convulsions. Blood pressure, 180-110. Venesection and morphine. Labor natural. Mother and child living.

CASE 16.—Mrs. C., white, aged twenty-three, primipara. Seen in consultation at Providence Hospital. Had been treated for toxemia. Flat pelvis. Seized with convulsion during trial labor. Head not fixed in pelvis. Cesarean section performed. Mother and child living.

CASE 17.—Mrs. S., white, aged thirty, primipara. Seen in consultation at Georgetown University Hospital, June 26, 1920. During tedious labor complained of diplopia and had two convulsions. Blood pressure, 198-120. Morphine given. Venesection, 600 c.c. Mid-forceps. Mother and child living.

CASE 18.—Mrs. J., white, aged nineteen, primipara. Admitted to Georgetown University Hospital, April, 1919. Blood pressure, 200-120. Two convulsions before admission to, and four while in, the hospital. Urine shows albumin and casts. Morphinized. Venesection, 500 c.c. Delivery spontaneous. Mother and child living.

CASE 19.—H., colored, aged thirty-two, primipara. Weight, 200 pounds. Admitted to Georgetown University Hospital, May 4, 1920, in labor. Blood pressure, 194-130. Urine contains albumin and casts. Had convulsion. Bled 500 c.c. Morphinized. Chill after venesection. Mid-forceps delivery. Stillbirth. Manual removal of placenta. Puerperium: Fever, maximum 101° F. Recovered. Second birth, May, 1921. Pregnancy and labor normal.

CASE 20.—Mrs. G., white, aged twenty-eight, primipara. Admitted to Georgetown University Hospital, May 24, 1920. In labor. Blood pressure, 180-130. Hot pack. Membranes punctured at 2:30 P.M. the following day. Convulsion at 3:15 P.M. Morphinized. Venesection, 500 c.c. Low forceps. Mother and child living.

CASE 21.—Mrs. S., white, aged twenty-four, secundipara. Admitted to Georgetown University Hospital, June 4, 1920. Pre-eclamptic toxemia. Blood pressure, 168-110. Urine contains albumin and casts. Left occipitoposterior position of vertex presenting. Twenty-four hours after admission she had the first convulsion. Second convulsion, 4:15 A.M., of the sixth. Bled 500 c.c. Third seizure at 6:00 A.M. Fourth and last convulsion at 3:00 P.M. In labor 62 hours. Treatment: Morphine, venesection, mid-forceps. Mother and child living.

CASE 22.—Mrs. B., white, aged twenty-six, primipara, at term. Seen in consultation. Admitted to Columbia Hospital, September 14, 1920, 4:00 P.M. In labor. Pre-eclamptic history: Headache, edema, general dimness of vision, etc.; urine contains albumin and casts. Membranes ruptured at 8:45 P.M. Pains regular. Thirteen hours after admission she had a convulsion followed by two more attacks at fifteen-minute intervals. At this time I saw the case in consultation. Examination revealed the cervix effaced and the os dilated about the size of a silver dollar. Head well engaged in left occipitoposterior position. As patient reacted well after convulsions, and labor progressed satisfactorily, conservative treatment was elected. As blood pressure had risen to 170-125, five hundred c.c. of blood was removed. Morphia was given at intervals; but the terrified nurse failed to carry out instructions to keep respirations down; so convulsions recurred, fifteen attacks in all. At 4:15 P.M., the cervix was fully dilated; forceps were applied (Scanzoni) and delivery effected. Puerperium normal. Mother and child living.

CASE 23.—Mrs. Z., white, primipara. Seen in consultation at Georgetown University Hospital. Postpartal eclampsia. Labor reported normal. Six hours after delivery she had three convulsions in 45 minutes. Blood pressure, 190. Treatment: Morphine and venesection, 1000 c.c. Mother and child excellent. Second labor, in 1920, normal.

CASE 24.—Mrs. M., white, 3-para; seen in consultation. Postpartal eclampsia. Treated for toxemia from seventh month, evidently without much relief as cardinal signs, such as headache, dimness of vision, edema, and positive urinary findings,

persisted. Blood pressure varied from 140-165. On admission to hospital blood pressure was 188-110. Labor normal and four hours in duration. Six hours postpartum (3:00 A.M.) she had a convulsion, and four more before 7:20 A.M. Morphine given. Sixteen ounces of blood removed. Despite vigorous elimination and heart stimulation coma gradually deepened; she had four more convulsions on the third day, and died in coma on the fifth day. Temperature had risen to 109° F.

CASE 25.—Mrs. V., white, aged twenty-eight, secundipara. Seen in consultation at Sibley Hospital, March 26, 1921, at 10:00 A.M. Had severe hemorrhage from marginal placenta previa. Unassisted delivery at 7:20 P.M. The following morning, after a restless night, patient had several convulsions in quick succession. Blood pressure, 170. Morphine was given and venesection performed, twenty ounces of blood removed. Patient in semicomatose state until third day; then gradually lessened and was rational on fourth day. Made splendid recovery. Child living.

CASE 26.—Mrs. W., white, aged twenty-six, primipara. Seen in consultation. Admitted to Georgetown University Hospital, May 19, 1921, at 7:15 P.M. History of persistent pre-eclamptic toxemia despite treatment. In labor. At 8:25 P.M. had a convulsion, and at 10:00 P. M., a second seizure followed. Gradually deepening coma uninfluenced by removal of eighteen ounces of blood and other measures. Labor was terminated with low forceps. Stillbirth, due to toxemia. Coma never lessened and temperature rose to 109° before death took place on the third day.

CASE 27.—Mrs. R., white, aged twenty-seven, primipara; seventh month of gestation; seen in consultation. Admitted to Georgetown University Hospital, March 5, 1920, with history of vomiting extending over two weeks. Blood pressure, 130-104. Urine shows albumin and casts. The toxemia yielded to diet and elimination. Left hospital at the end of two weeks, much improved. Readmitted April 27, in labor. Had convulsion during second stage. Delivered with low forceps by attending physician. Mother and child living.

CASE 28.—Mrs. H., white, aged thirty-three, 4-para, eight months' gestation. Seen in consultation, May 11, 1921. History of several convulsions. Patient removed to Columbia Hospital for observation. Previous pregnancies and labors reported normal. Blood pressure, 128-88. Urine reveals albumin and granular casts. Treatment: Bromides and eliminants gave relief and patient was sent home on fourth day. Normal labor one month later. Mother and child living. There is, likely, a hysterical factor in this case. The physician reports that, beginning three weeks after confinement, patient had a convulsion, and that they recurred from time to time since.

CASE 29.—Mrs. Y., primipara, seventh month of gestation. Seen in consultation at Georgetown Hospital, September 12, 1921, at 10:30 P.M. Marked toxic condition extending over several weeks, which had not yielded to treatment. Labor pains began about 7:00 P. M. At 9:30 P. M. she had a convulsion and another, one hour later. Blood pressure, 170. Morphinized, and sixteen ounces of blood removed. Membranes ruptured spontaneously at 5:00 A. M. Spontaneous delivery occurred at 8:00 A. M. Child living. Mother rational and doing well.

SUMMARY

It will be noted that nearly all of the cases had suffered from pre-eclamptic toxemia. Several had been treated, but the toxemia persisted; some had been treated indifferently, and most of them not at all.

We find that morphia, if given properly, will control the con-

vulsions. Its ease of administration and certainty of action, make it preferable to other sedatives.

Venesection we believe to be a most valuable measure. Where the blood pressure is high, with cyanosis, recurring convulsions, deepening coma and threatened edema of the lungs, it is particularly serviceable. Its beneficent effect was strikingly shown in a postpartum case, seen in consultation recently, and the writer is convinced that the bloodletting was the principal means of saving the patient.

Cesarean section was performed by election in a primipara over forty years of age; another was performed on a primipara with flat pelvis, who had a convulsion during a test of labor. The head was not engaged in the brim. In the third and fourth cases, morphinization and bleeding had been done before the cesarean section was undertaken. We believe these patients were benefited by the tranquilizing effect of the sedative and elimination obtained before operation.

All of the forceps cases were done after complete dilatation of the os in order to expedite the delivery.

Labor was induced with the bag in all of the threatened eclampsias, and in three of the actual eclampsias; the bougie was used in one case.

We do not forcibly dilate an intact or rigid cervix. It is irrational and unjustifiable. The physiologic and anatomic changes necessary to soften and unfold the cervix and dilate the os, must be borne in mind. To divulse the intact cervix in a few minutes by instrumental or manual methods, is unscientific, dangerous, and brutal. It violates Nature's law, which, under normal conditions, requires hours, thus preserving the integrity of the soft parts.

We do not give chloroform or nitrous oxide, because both induce acidosis. Ether, while not free from objection, is the least harmful anesthetic, but its administration should be restricted to the time of operative intervention.

The salutary influence of sedation and elimination was demonstrated in two of the antepartum cases; the convulsions ceased, the patients became rational, and spontaneous labor occurred several days later. Several of the intrapartum cases also regained consciousness before birth.

Of the two deaths, one at term had the first convulsion six hours after a normal delivery; the other, an antepartum case of seven months' gestation, had two convulsions and lapsed into gradually deepening coma, which continued until death took place on the third day. Both of these cases had been carefully supervised for weeks before the eclamptic seizures and the persistence of the toxemia, despite treatment, indicated that they might have been saved by induced labor.

From the foregoing data we offer the following deductions: 1. The

importance of prenatal care. 2. Intermediate and conservative treatment yield lower mortality and morbidity than is obtained by surgical and forcible intervention. 3. Immediate delivery by cesarean section is rarely necessary, unless there are present indications of disproportion, rigid cervix, etc. 4. Radicalism is prompted largely by fear and expediency.

Prenatal care means careful supervision of the pregnancy, interrogating the various organs and functions from time to time. Persistent high blood pressure, resisting treatment, points to kidney insufficiency. It is here that the ophthalmoscope may reveal a developing retinitis long before the patient complains of impaired vision or the urine shows albumin and casts. The ophthalmoscope is the only means by which the earlier and relatively much less serious stages of toxemic retinal involvement can be detected. A progressive retinitis is a valuable prognostic sign for induction of labor, safeguarding vision and averting the outbreak of eclampsia. By this valuable procedure we were able to check up a developing retinitis in one of the pre-eclamptic cases, and labor was induced with gratifying results, saving both mother and child.

The blood and urinary findings, showing an increase in retention of nitrogenous products, particularly uric acid and creatinin, with changes in the ratio of urea nitrogen and nonprotein nitrogen are indicative of kidney insufficiency and give unfavorable prognosis, if the toxemia is not controlled.

The frequency of eclampsia could be greatly diminished if more careful supervision of the pregnant woman was exercised. The perfunctory examination of the urine for albumin, during the latter weeks of pregnancy, is not sufficient. The constitutional signs and symptoms should be closely scrutinized and if these persist following the use of vigorous and active measures, the safety of the mother and infant lies in the induction of labor.

The psychology in the treatment of eclampsia from the standpoint of the physician and surgeon is interesting. Analyzing my own state of mind I was dominated by subconscious fear, due primarily to want of familiarity with the disease and some unfortunate experience with accouchement forcé. Naturally the application of the cesarean section appealed to me as a saner and safer method. I therefore advocated and followed it. Upon review of my surgical work, however, I became convinced that some of the cases I had subjected to section, could have been delivered by more conservative measures, thereby preserving the integrity of the uterus. This proved to be the turning point in my attitude towards eclampsia. From then on I found myself studying each case with equanimity and deliberation and balancing action on judgment.

Fear and expediency are, I am satisfied, from experience as a consultant and from observation, potent factors in the radical treatment of eclampsia. The attending physician, unaccustomed to treating such cases, is very apt to become panicky and urge immediate delivery. The consulting surgeon, who thinks largely in surgical terms, not infrequently acquiesces and performs cesarean section.

It is easy to yield to such importunity and even a fatal result is likely to be accepted without question. It is not easy, however, for the obstetrician who elects to conduct the case along conservative lines extending over some hours. This postulates obstetric judgment and courage.

The keynote in the treatment of eclampsia is prevention. Yet either in the prevention or the treatment of actual eclampsia an even mind is essential. *"Aequam memento rebus in arduis servare mentem,"* as the old Latin bard has sung.

It was the clinical observation of Semmelweiss which led to the recognition that puerperal fever and wound infection are identical and preventable; Pasteur lifted the veil which for centuries hid the cause of disease, by exposing their microbian origin, while Lister laid the foundation of aseptic surgery with its manifold possibilities in the cure and alleviation of maladies; so may it be the good fortune of another genius to find the key that will unlock the mystery of the toxemias of pregnancy that motherhood may be immunized against this frightful scourge. May this Association be the parent of this genius.

2426 Pennsylvania Avenue.

(*For discussion, see p. 193.*)

A STUDY OF THE ORIGIN OF BLEEDING IN ECTOPIC PREGNANCY*

By John O. Polak, M.D., F.A.C.S., and Thurston S. Welton, M.D., F.A.C.S., Brooklyn, N. Y.

THE bleeding in tubal pregnancy occurs as an early suggestive symptom in all tubal abortions, during the ovular unrest preceding tubal rupture, and, usually, at the time of the primary rupture.

To understand the mode of occurrence of this hemorrhage one must accept the analogy between uterine pregnancy and tubal gestation, with certain differences due to the morphology of the tubal mucosa. Furthermore, the mode of implantation of the ovum in the tube has a definite causative significance.

The ovum can develop only on a spot free from epithelium, sinking through the decidua to rest on the subepithelial layer of the muscularis, and producing by its presence such reaction as to provoke dilatation of the lymph spaces and edema of the myometrium and endometrium immediately surrounding the ovum.

As the ovum sinks in, the side walls of the cavity become united over the ovum by organized blood clot and fibrin and form a false reflexa. The decidual reaction in the tube is imperfect and scattered. There are cases in which no true decidua has been found (Aschoff), but where there is decidual reaction it is the same as found in the uterus; it is also noted at points in the tube, remote from the seat of the ovum implantation.

Fecundation is definitely known to take place in the tube during the passage of the ovum through the tube to the uterus. It has been shown that "in a tube, partially recovered from an inflammatory process, there may be found pockets, diverticula, and constrictions which cause the arrest of the majority of ova, and that implantation takes place at any point at which this arrest occurs." (Mall.)

This implantation may be columnar, intercolumnar or centrifugal. Columnar embedding is rare and occurs when the ovum attaches itself to one of the tree-like folds of the tubal mucosa, later it becomes attached to other folds; but at no point is it in contact with the tube wall itself. In such an implantation the ovum derives its nourishment from the blood vessels of the mucosa until the mucosa becomes eroded by the action of the syncytial cells, and then the ovum comes to lie in the tube wall when the villi penetrate the muscularis.

*Read at the Thirty-Fourth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, St. Louis, Mo., September 20 to 22, 1921.

In the intercolumnar form of implantation the ovum embeds itself in the cleft between the folds of the tubal mucosa and thus rests upon the surface of the tube wall, at once eroding itself into the muscular coat. In this case the mucosal folds unite over the embedded ovum and form a false reflexa.

In the centrifugal implantation, the ovum sinks into the wall of the tube and the villi invade the muscular wall and vessels, including all structures, even the serosa. The pseudoreflexa is formed by the side walls made up of the muscularis and the mucosa, into which the ovum has sunk.

The invasion of the blood vessels by the villi causes hemorrhage into the intervillous spaces. The villi may extend up to and through the

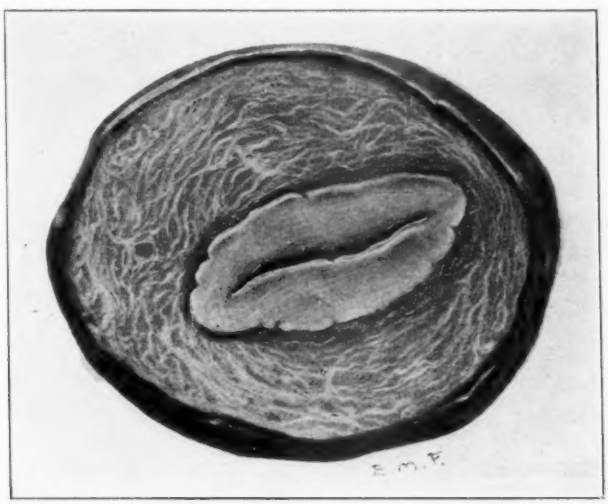

Fig. 1.—Cross section of uterus showing decidual development in a case of three months' ectopic gestation.

serosa; rupture usually takes place through penetration of the tube wall at the placental site, as a result of this erosion by the villi.

One observation has been constant, no matter what form of implantation has taken place, i.e., there is always an excessive amount of hemorrhage about the ovum, owing to the fact that there is no true decidua to protect the tubal vessels from erosion. The constant erosive action of the trophoblast causes considerable hemorrhage. Mall states that the blood in immediate apposition to the trophoblast does not clot, and thus continues to contribute towards the sustenance of the ovum.

Our observations are in accord with Mall's and Litzenberg's that, whenever we have found an early unruptured pregnancy, the ovum was very small and separated from the tubal wall by a definite layer of blood.

The tubal and uterine placenta are identical in formation. The pathologic changes which take place in tubal pregnancy are due to the thin tube walls and the absence of a true decidua serotina, which allows easy invasion by the trophoblast and syncytial cells; consequently there is no active connective tissue reaction set up by the presence of the fetal cells.

The villi rapidly penetrate the tube walls and then perforate the serosa, producing a porosity which allows blood to escape through the tube wall into the peritoneum, even before the tube wall is so weakened as to produce rupture.

Owing to these changes the tubal placenta suffers from lack of nutrition, which explains the number of pathologic embryos found in tubal pregnancies. Syncytial cells and bits of villi are often found in the tubal veins remote from the site of the pregnancy.

Fig. 2.—Author's specimen, showing complete decidual development in the uterus and incomplete reaction in the tube in a nine weeks' pregnancy. The imperfect reaction in the tube is the basic cause of the symptoms of tubal abortion or rupture.

Whenever an ovum implants itself in the tube wall, the gestation sac is bounded on all sides by a layer of trophoblastic cells and masses of fibrin, and a pseudodecidua reflexa is formed by trophoblastic elements and the overlying mucosa. Frequently the trophoblastic cells, owing to their erosive quality, lie between the muscle bundles; the decidual reaction is imperfect and irregular, found in remote portions of the tube, while the syncytial cells invade the blood vessels in the tube wall. The absence of a developed decidua allows excessive erosive action in the tube wall, and favors early rupture of the gestation sac.

Owing to the effusion of blood into the imperfectly formed decidua, and between the underlying tube wall and ovum and the separation of

the nutritive villi from the tubal vessels, the blood accumulated about the ovum, increases the separation, stimulates peristaltic tubal contraction, and favors tubal abortion.

Whenever pregnancy occurs, no matter what its location, a decidua vera develops within the uterus. The uterus is enlarged because of the hyperemia and thickened endometrium. These changes in the endometrium are quite similar to those found in the decidua vera in early intrauterine pregnancy.

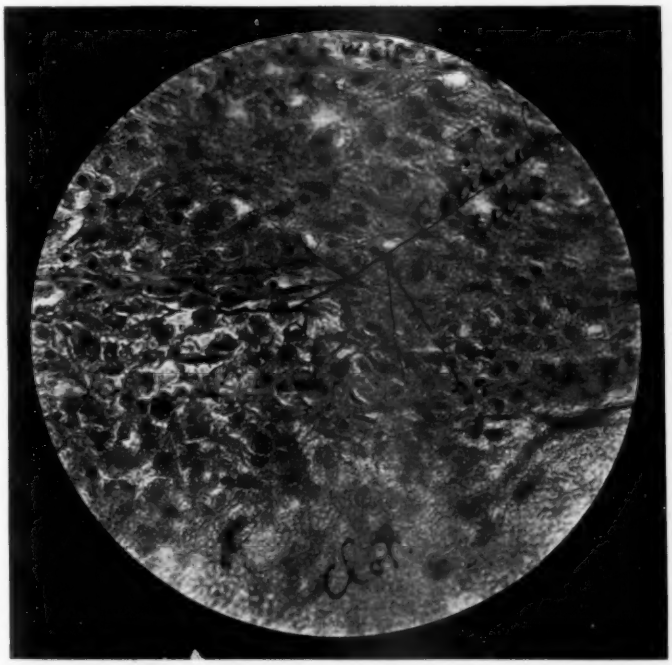

Fig. 3.—Section of tubal wall from an ectopic gestation, showing hemorrhage into the decidua at a point remote from the site of implantation of the ovum.

While tubal pregnancy is being terminated, the tube undergoes a measure of intermittent contraction, endeavoring by its peristaltic action to expel the contents; these contractions are transmitted to the uterus, which in turn contracts as in abortion, giving rise to uterine pain. The clinical expression of these uterine contractions is bleeding from the endometrium with extrusion of portions of the decidua.

Uterine bleeding indicates ovular unrest in the tube, due to hemorrhage about the aberrant ovum, and the threatened termination of the ectopic pregnancy. So long as the embryo is living and development is in progress, there is no uterine bleeding.

The uterine bleeding, which is usually small in amount, may continue for a considerable time after the attack of pelvic pain which, apparently, marks the destruction of the embryo. This is due to the

fact that the termination of the tubal pregnancy is not necessarily at once complete, chorionic villi remaining alive, exerting their stimulus upon the uterus.

Fig. 4.—Photomicrograph of a section of uterine decidua from a case of ruptured extrauterine pregnancy at the third month, showing absence of blood in the decidual layer.

Fig. 5.—Same as Fig. 4, showing glandular structure.

Sampson found that the uterine bleeding, in all cases, was of venous origin and arose from the endometrium, and that blood did not escape from the tube into the uterine cavity. On the other hand, we have demonstrated that when the pregnancy is close to the uterus, some blood does escape through the uterine end of the tube, that the metrorrhagia has both a uterine and tubal origin, and that there is always hemorrhage into remote parts of the tube, just as there is decidual reaction at other than the seat of the ovum.

The uterine involution which takes place following the complete termination of tubal pregnancy is analogous to that following labor or abortion. When involution is delayed there is an incomplete termination of the tubal pregnancy, just as there is delayed involution when there is retained material in a uterine abortion.

The decidual cast of the uterus is passed, either *en masse*, or piecemeal, in fully 50 per cent of the recorded cases of tubal pregnancy. The pain accompanying this expulsion is nothing more than a sympathetic labor on the part of the uterus. All authorities are agreed that, in every instance where a fecundated ovum has embedded itself and developed, a uterine decidua is formed.

The ectopic cast has definite microscopic characteristics. It may be divided into a distinct compact and spongioid layer and fails to exhibit any evidences of chorionic villi. The large decidua cells with well defined nuclei, packed closely together, which make up the decidua compacta, are always characteristic proof of pregnancy.

CONCLUSIONS

(1) Our studies have shown that a decidual reaction may be found at several points in the tube in ectopic points often far remote from the seat of implantation.

(2) That coincident with the separation or death of the ovum by hemorrhage into the decidua, there is bleeding from the uterus and also bleeding from the several points of decidual reaction in the tube.

(3) That tubal peristalsis and the *vis a tergo* of the clot in the tube, expels blood from the abdominal ostium into the peritoneum, which gravitates into the culdesac.

(4) That the same factors contribute a portion of the blood, making up the bloody discharge from the uterus, which signifies the separation or death of the embryo.

20 LIVINGSTON STREET.

(*For discussion, see page 195.*)

A STUDY OF PITUITARY EXTRACT AT THE BEGINNING OF THE THIRD STAGE OF LABOR. ITS USE IN 100 CASES*

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IN ORDER to ascertain the effect and analyze carefully the results, we administered to 100 patients, immediately after the birth of the child, 1 c.c. of infundin hypodermically. We waited the customary 20 minutes, during which time the uterus was carefully observed and the blood loss measured; at the end of this period the placenta was expressed, if it had not been expelled spontaneously. After the delivery of the placenta all blood lost, during the succeeding hour, was measured.

There were 43 primiparae and 57 multiparae in this series. There were 96 patients at or near term. Two were between 8 and 8½ months; one was between 7 and 8 months, and one was between 6 and 7 months.

METHOD OF DELIVERY

In this series there were 87 spontaneous deliveries and 13 operative deliveries; of the latter there were 5 low forceps operations, 3 median forceps operations, 2 versions,—1 for prolapsed cord and 1 for shoulder presentation, 3 breech extractions. As a matter of interest, in the 13 operative cases in both primiparae and multiparae, the maximum total blood loss was only 390 c.c.

The placenta was expelled spontaneously in 19 cases; this may be compared with Ryder's 25 spontaneous placental expulsions in his series of 100 pituitrin cases, and may be contrasted with a total number of nine spontaneous placental expulsions in 1000 labors in which pituitrin was not used, in Williams' series. In our 19 cases in which the placenta was expelled spontaneously, the minimum time required was 4 minutes and the maximum time required was 18 minutes; the average being 10½ minutes. In 78 minutes the Credé method of expression was used. In 3 patients the placentae were manually extracted. In the first case, the Credé method was tried several times and then when the placenta was visible in the cervix at the outlet, manual extraction was easily performed.

In the second case, the Credé method was tried repeatedly and then, because of continued bleeding, the hand was passed into the uterus, where it was found that there was an hour-glass contraction; the pla-

*Read at a meeting of the New York Obstetrical Society, November 8, 1921.

centa being partly above and partly below the area of constriction. The placenta was not adherent and was very easily extracted.

In the third case, after one hour the placenta was found in the vagina and was manually removed.

Blood Loss During the Third Stage.—In 26 cases (12 primiparae and 14 multiparae) the blood loss did not exceed 30 c.c. The maximum blood loss in primiparae was 525 c.c.; in multiparae 1230 c.c. (Hemorrhage three pounds in weight.) The average blood loss in primiparae was 110 c.c.; in multiparae was 153 c.c. The average in all cases during the third stage was 135 c.c.

Blood Loss After the Third Stage.—In 77 cases (33 primiparae and 44 multiparae) the blood loss did not exceed 30 c.c. for a period of one hour following the delivery of the placenta. The maximum blood loss in primiparae was 750 c.c.; in multiparae was 800 c.c. The average blood loss in primiparae was 47 c.c.; in multiparae was 36 c.c. The average in all cases was 41 c.c.

Total Blood Loss.—The tables have been prepared to show the number of primiparae and multiparae, the duration of their respective labors, and their respective blood losses.

TABLE I

SPONTANEOUS DELIVERY

DURATION OF LABOR	NUMBER OF CASES		SUM TOTAL OF C.C. BLOOD LOSS		AVERAGE C.C. BLOOD LOSS	
HOURS	P	M	P	M	P	M
8	5	29	990	5245	198	180
8-16	12	15	1180	3685	98	245
16-24	7	8	1000	1145	143	143
24-36	7	2	1160	110	165	55
Unknown	2		940		470	

P=Primiparae.
M=Multiparae.

TABLE II

OPERATIVE DELIVERY

DURATION OF LABOR	NUMBER OF CASES		SUM TOTAL OF C.C. BLOOD LOSS		AVERAGE C.C. BLOOD LOSS	
HOURS	P	M	P	M	P	M
8	0	1		200		200
8-16	5	1	405	390	81	390
16-24	4	0	825	0	206	0
24-36	1	1	300	120	300	120

P=Primiparae.
M=Multiparae.

The average total blood loss of all primiparae who delivered themselves spontaneously was 160 c.c. This may be compared with the average total blood loss in the 10 operative primiparae which was

153 c.c. The average total blood loss for all primiparae was 158 c.c. The average total blood loss in multiparae who delivered themselves spontaneously was 188 c.c. The average total blood loss in the operative multiparae was 236 c.c., making an average total blood loss in all multiparae 191 c.c. The average total blood loss in the complete series of 100 cases was 177 c.c.

At this point we wish to call particular attention to three cases of this series in which the blood loss was marked:

CASE 1.—Multipara, having had three previous normal deliveries. The duration of this labor at term was five hours, vertex presenting, the patient having had a few whiffs of ether and chloroform. Five hundred c.c. of blood were lost before the birth of the placenta. The Credé method was tried a number of times unsuccessfully. After waiting one hour, moderate bleeding continuing, it was decided to remove the placenta manually. An hour-glass contraction of the uterus was found, the placenta being ¾ below and ¼ above the constriction; it was easily removed, the total blood loss being 1410 c.c. In our opinion the large blood loss in this particular case was probably due to the administration of the pituitrin.

One of the writers had an experience recently, in which an hour-glass contraction of the uterus appeared in the third stage, and followed the administration of 5 minims of infundin in the latter part of the second stage. In another case where 1 c.c. of pituitrin was given after repeated attempts at Credé, the cervix was so tightly contracted that the placenta was extracted only with the greatest difficulty.

CASE 2.—Primipara, at term, was delivered spontaneously and after 25 minutes the placenta was expressed with considerable difficulty by the Credé method. During this period 80 c.c. of blood were lost. Following the birth of the placenta there was a profuse hemorrhage (750 c.c.) and the uterus was packed immediately. A fibroid, the size of an apple, was found in the lower uterine segment, and probably was responsible for at least part of the hemorrhage.

CASE 3.—Multipara, at term, delivered normally, after a 13½ hour labor. The placenta was expressed with moderate difficulty by the Credé method 30 minutes later. During this time, the woman lost 450 c.c. of blood. After the expression of the placenta there was no blood loss and the patient was taken to her bed. About 45 minutes later the uterus was soft and flabby and the woman was bleeding profusely. The uterus was packed at once. The total measured blood lost was 1250 c.c. This case emphasizes the importance of careful observation of the uterus, even though pituitrin has been given.

The average loss of blood during labor in which pituitrin is not used at the beginning of the third stage is variously estimated at 343 c.c. by Williams in 1000 spontaneous labors; 300 c.c. by De Lee; 300 to 500 c.c. by Leavitt, and 505 c.c. in 2058 cases by Ahlfeld. In contrast with these figures, Ryder states that the average blood loss in his series of 100 cases in which pituitrin was used at the beginning of the third stage was 180 c.c. This corresponds very closely with an average blood loss of 177 c.c. in our series of 100 cases. Based on these series of 200 cases,—Ryder's and the authors'—the average blood loss is materially reduced. Further, in Williams' series of 1000 cases without pituitrin there were 130 in which 600 c.c. or more of blood were

lost; in contrast to these figures, Ryder in his series had no blood loss of 600 c.c. In our series we had but four.

In conclusion, we are of the opinion that in the vast majority of cases, the method as outlined is safe and valuable in minimizing blood loss. We agree with Ryder that the uterus must be observed just as carefully as when pituitrin is not given. The only drawback to the method in our small series of 100 cases, is the possibility of irregular or hour-glass contraction of the uterus which occurred in one of our series and which has occurred to the authors in several cases outside of this series where pituitrin was given. We recognize the fact, however, that this complication occurs independently of the use of pituitrin, and time only will prove and further investigation will be necessary to show whether this complication is directly attributable to the method or not.

We believe that earlier removal of the placenta would probably have reduced the blood loss in some of our cases.

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50 West Forty-eighth Street. (*For discussion, see p. 205.*)

REPORT OF THREE CASES OF A RARE OVARIAN ANOMALY

By James C. Janney, M.D., Boston, Mass.

Casler[1] recently reported an interesting case which showed, among other things, the occurrence of uterine tissue in the ovary. Norris,[2] in the discussion of this paper, reported a similar case from his practice. At the time Casler's article appeared, I had in preparation the report of such a case and since that time have found two others, all of which I am here reporting together.

Ovarian anomalies of any sort are of sufficiently rare occurrence to be interesting. A search of the literature on the subject will show that they are not frequent, but the standard works yield a goodly array of different conditions which sometimes occur. These anomalies are of four sorts: (A) Anomalies of number; (B) Anomalies of development; (C) Anomalies of position; (D) Miscellaneous.

There are three variations of number: (1) Absence of one or both ovaries; (2) Accessory ovaries; (3) Supernumerary ovaries: all rare conditions. Accessory ovaries occur more frequently than the other variations and are usually situated very close to the "normal" ovary, sometimes being separated only by a cleft which looks like an ex-

tremely developed lobulation. The supernumerary ovary is of extreme rarity. Dudley[3] states that it has been authenticated in only one case, that reported by Winkle in Albutt and Playfair's "System of Gynecology." Absence of the ovary is usually associated with absence of the tube and uterine cornu of the same side. Absence of both ovaries has been reported, but is said to occur only in nonviable fetuses.

Anomalies of development may affect either the ovary as a whole, or may appear in isolated areas as embryonic rests. Those which affect the ovary as a whole are rudimentary conditions, congenital hypertrophy and presenile atrophy. The cases of rudimentary ovaries seem to be closely related to those which show absence of the ovary, for they too usually show underdevelopment of the follicle apparatus of the ovary and also the infantile type of uterus and tubes. This condition varies in degree and it seems likely that the cases of dysmenorrhea, irregularity, retroposition, and anteflexion with conical cervix are associated with ovaries which are underdeveloped, at least functionally. Congenital hypertrophy of the ovary is often reported as an anomaly, but some authorities (Dudley) incline to the belief that it represents, rather, the results of early inflammatory or vascular changes. Presenile atrophy of the ovary is not infrequently encountered in women of the third and fourth decades and is characterized by a sclerosis of the cortex and a marked diminution in the number of follicles. Such a condition would be normal in a woman who is close to the menopause, but not in a woman at the age of 35. It is little understood and may conceivably be either another grade of the underdeveloped ovary, or a state brought about by unknown factors in later life, possibly endocrine derangements.

The embryonic rests are the rete ovarii, egg tubes of Pflüger, either solid or tubular, remains of the Wolffian body or ducts, and possibly teratomata. These structures, with the exception of the last, are all of microscopic proportions and of little practical importance. Whether teratomata should be properly classed as embryonic rests and included among ovarian anomalies does not come within the scope of this paper, but if they be so included, they form the only group in the category which is of clinical importance and are sufficiently well known to need no further mention here.

The anomalies of position are as rare as those of number. Hernia of the ovary is described, as is the undescended ovary. Lateral and posterior descensus are also described, but here again there is a question whether these conditions ever occur except secondary to malpositions elsewhere in the genital tract.

Under the heading of "miscellaneous," are two conditions given by Veit,[4] namely, bud-like projections from the albuginea of senile ovaries and extravasations of blood about the follicles. I believe that both of

these conditions are open to question as true anomalies. The former is very suggestive of fibroma of the ovary and the latter of some traumatic or infectious origin.

All of the anomalies of the ovary, then, may be said to be of academic interest only, with the exception of the teratomata and herniae of the ovary, which are of practical surgical importance, and the cases of underdevelopment, from the standpoint of endocrine therapy. It may well be that the relative infrequency of ovarian anomalies of all sorts is due in considerable degree to the concealed position of the ovary, and that if the ovary were as easily accessible as the testicle, these anomalies—some of them at least— would be of more frequent record and more importance from the viewpoint of practical therapy.

The three cases which I have to report all show the occurrence of uterine tissue in the ovary. They were found in going over a part of the pathologic collection at the Free Hospital for Women, Brookline, Mass., and occurred in a total of 4853 pathologic specimens examined. They were all discovered incidentally, the operations having been performed for other conditions which had not directed attention primarily to the ovaries.

CASE 1.—(Path. No. 2017.) Miss Mary K, aged 41, admitted to the Free Hospital for Women, February 26, 1909, with the complaint of flowing. Her family history was unimportant, as was her past history, with the exception of the menstrual

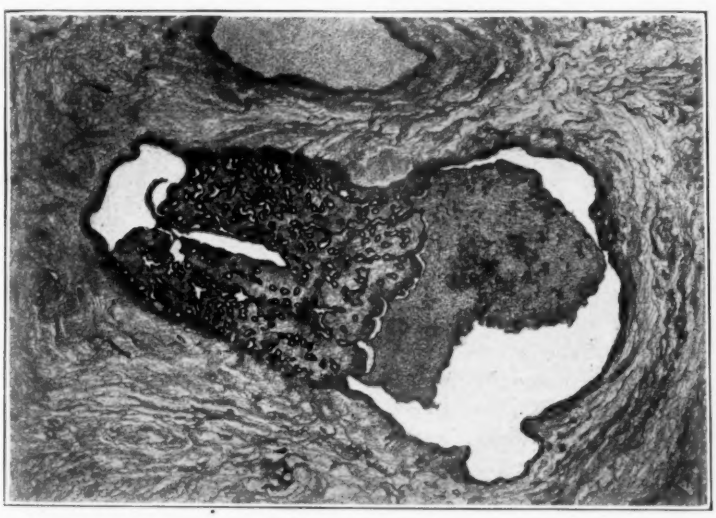

Fig. 1.—PATH. 2017, low power drawing, showing the relation of the uterine tissue to the cyst of the ovary.

condition. She had been well until the onset of the present illness, which she dates back two years.

Menstruation commenced at twelve years of age and was regular, with moderate pain the first day. Periods lasted four days, and she used seven napkins. There was no vaginal discharge between periods. Two years ago her periods lengthened

to two to three weeks every month, which condition had persisted until January (the month previous to entrance). In January she skipped her period. About four weeks previous to admission she took a long walk, then a hot bath, after which she had severe hemorrhage without pain. The flowing necessitated three to ten napkins daily. She passed some clots. This condition persisted until admission.

Physical examination was negative, except for the pelvic examination, which was made by Dr. William P. Graves. Dr. Graves' note was as follows: "Uterus anteflexed and drawn back in pelvis; mass behind uterus, indefinite to touch and not very tender." This examination was confirmed under ether March 4, and operation was performed at that time by Dr. Graves. The pelvic structures were all found to be involved in an inflammatory process with many adhesions. Supravaginal hysterectomy with bilateral salpingo-oophorectomy was performed, and the patient made an uneventful recovery.

Pathologic Report: "Specimen consists of uterus with ovaries and tubes attached, vermiform appendix, and a small myoma. Uterus has been amputated at the level of the internal os and opened on its anterior surface. There are adhesions about the fundus, especially on its posterior surface. Both ovaries are much enlarged and

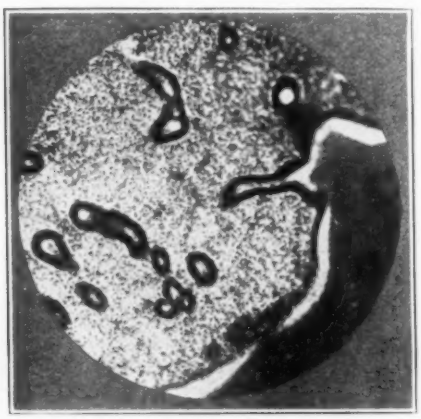

Fig. 2.—PATH. 2017, low power, showing the uterine stroma and glands, and at the right, the blood clot within the cyst cavity.

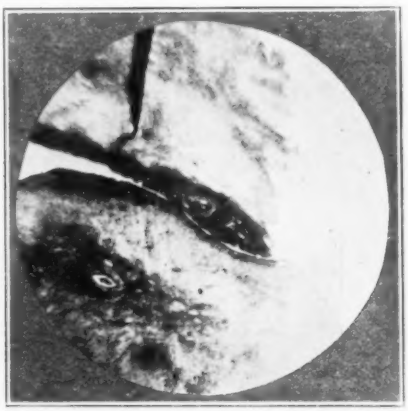

Fig. 3.—PATH. 2017, low power, showing the uterine tissue in a cleft of the ovary of the opposite side.

cystic. Fimbriated ends of both tubes closed. On opening the uterus the walls seem to be slightly hypertrophied. The endometrium is thick, about 2 mm. in depth, but there are no intrauterine polypi or other growths. Both tubes and ovaries are densely adherent and bound into one mass. The left tube is dilated and contains clear straw-colored fluid; walls are thin, forming a true hydrosalpinx."

In summary, the microscopic findings were: Chronic interstitial endometritis with hypertrophy of the endometrium, myoma uteri, hydrosalpinx, and periovaritis with evidences of still active inflammatory process.

The interesting anomaly occurred in the ovaries, both of which were involved. In one it consisted of a piece of tissue 4 x 2 mm., which appeared to be endometrium, springing from the wall of a small cyst which measured about 7.5 mm. in its greatest diameter. The cyst contained blood clot. The section of the other ovary was torn in cutting and the relations were much distorted. The uterine tissue in this ovary was not so extensive in amount and was situated on the edge of what appeared to be either a cleft or a collapsed cyst. The finding of this tissue, of course, raised the question of some strange accident in cutting and mounting. Careful examination

showed that no such artefact had taken place and that the tissue was actually growing in and part of the ovary. (Figs. 1, 2, and 3.)

CASE 2.—(Path. No. 4136) Mrs. B. W., age forty-eight, entered the hospital April 14, 1913, with the complaint of having had "the womb come outside" for the past four years. Family history was unimportant as was the past history, except for nocturia, two to three times every night. Menstruation had always been normal. She had passed through the menopause nine years previously and had subsequently suffered considerably from nervousness and hot flushes for two years. These were not so troublesome at time of admission. She had had five pregnancies with normal labors. The last child was stillborn. No abortions. Present illness dates from four years ago when the uterus first began to come out. This had grown steadily worse and has caused sacral backache and a dragging feeling in the lower abdomen. Physical examination was negative, except for the local examination by Dr. Graves, which showed separation of the recti muscles, atrophy of the external genitalia, cystocele, lacerated cervix and perineum, and moderate prolapse. Operation April 16, 1913, by Dr. Graves, curettage, trachelorrhaphy, anterior colporrhaphy, perineorrhaphy, supravaginal hysterectomy, and repair of diastasis recti. Recovery was uneventful.

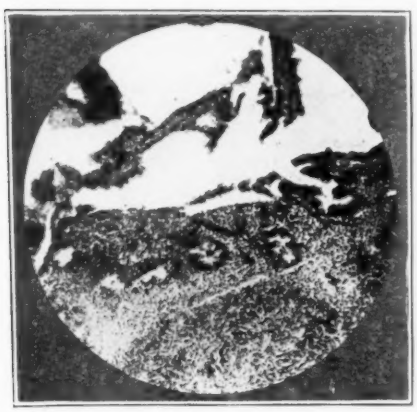

Fig. 4.—PATH. 4136, low power, showing the uterine tissue on the surface of the ovary.

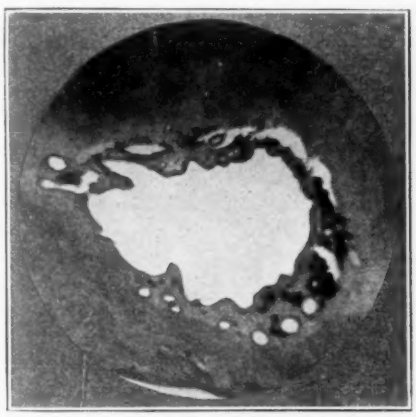

Fig. 5.—PATH. 4815, 2 inch, showing the cyst lined with endometrium.

Pathologic Report: "Specimen consists of uterus with both tubes, both ovaries, and a piece of cervical tissue. Uterus measures 5 x 6 cm.; no adhesions seen. Uterine cavity is 3 cm. long, endometrium is 1 mm. thick and covered with blood. Right tube is 5.5 cm. long, very tortuous, but shows no adhesions. Right ovary is 2.5 x 1 cm., and shows nothing remarkable. Left tube is 5 cm. long; shows nothing remarkable. Left ovary measures 2x3 cm., has many adhesions on it, and contains a few small cysts."

Microscopic examination shows a good deal of connective tissue in the cortex of both ovaries. In summary, it showed interval endometrium, chronic salpingitis, bilateral. Normal ovary, right; chronic periovaritis, left; chronic cervicitis.

The uterine tissue occurs in the right ovary in this case and covers an area of approximately 2x1 mm. It is on the surface of the ovary and is not enclosed in a cyst as in the former case. (Fig. 4.)

CASE 3.—(Path. No. 4815.) Mrs. G. C., age forty-four, entered the hospital March 28, 1914, complaining of flowing. Family history unimportant. An operation was done nine years previously at Boston City Hospital for gastric ulcer. Menstru-

ation began at 17, was regular and normal until one year ago, when present illness began. She had slight yellowish discharge. Micturition two to six times in day and one to three at night; at times has dysuria. Present illness started one year ago. Since then she has has had a backache and dull ache in both lower quadrants, worse during periods. The latter have become irregular, appearing at intervals of two to six weeks and lasting from six to twenty-one days. The flow was very profuse, necessitating twelve to fifteen napkins daily. Physical examination was negative with the exception of the pelvic examination which was made by Dr. Graves. This revealed uterus large and anteflexed, some loss of mobility, nothing definite felt on the sides, scar in posterior vaginal wall, lacerated cervix and perineum, cervical polyp. On March 31 operation was performed by Dr. F. A. Pemberton consisting of curettage, removal of cervical polyp, perineorrhaphy, and supravaginal hysterectomy. At operation the uterus was anteflexed and adhesions were found about the adnexa on both sides. The patient made a good recovery.

Pathologic Report: "Specimen consists of cervical polyp, curettings, and a uterus with two tubes and ovaries. Uterus measures 6x5 cm.; the endometrium is 3 mm. thick and smooth. There are no adhesions; tubes and ovaries look normal. On section the right ovary is found to consist of a cyst 3 cm. in diameter; no ovarian tissue was left. Left ovary is small, seems to be atrophied. Section taken of polyp, curettings uterine wall, right tube and left ovary." Histologic examination showed (in summary) interval endometrium, mucous polyp of the cervix, chronic salpingitis, bilateral, atrophy of left ovary, adenomyoma (?), retention cyst of right ovary. The microscopic note on the left ovary said: "Left ovary shows, in one place, glandular tissue surrounded by connective tissue which looks like endometrium of the uterus."

This glandular tissue in the section of the left ovary occurs in the wall of a small cyst as in the first case. It measures roughly 3x2 mm.

The more detailed histologic description of the uterine tissue in these three cases, I shall group together for the reason that the tissues are practically identical in structure. The tissue is composed of stroma and epithelial elements in about the same proportion as normal uterine mucosa. All of the cell nuclei in the stroma stain readily with hematoxylin, are regular in size and shape, and show the usual finely granular nuclear markings and a single small deeply staining nucleolus, usually eccentric. The cytoplasmic elements of the cells show a delicate reticulum, taking the acid stains. Definite mitotic figures are rare in the stroma, two only being seen. There are many irregular hyperchromatic nuclei which are apparently undergoing some change preparatory to division, but they are not characteristic mitotic figures. (Fig. 7.)

The epithelial elements are composed of columnar cells, which cover the surface fronting on the cavity of the cyst, and which line the gland spaces. The gland spaces themselves are, in places, quite irregular in size and outline, which is the main feature divergent from normal interval endometrium. These irregular glands are counterbalanced, however, by many small round glands in every way characteristic of normal uterine glands. The epithelial cells are uniform, with a good basement membrane and show no tendency to invade the deeper struc-

tures. The cell nuclei are oval and arranged near the basal end of the cells. They show numerous mitoses, as are commonly seen in the post-menstrual and interval periods of the endometrial cycle. These mitoses are very definite, showing a variety of monasters, diasters, and spindles. No ciliated epithelium was seen in the sections.

In two of the cases there were small bundles of cells on the edges of the uterine tissue which closely resembled smooth muscle. The identification of these cells could not be determined beyond question in the sections available and other sections and stains could not be made. All the sections of these cases were frozen sections and not adapted for the study of the finer cell structure. Unfortunately the gross material from the first case of the series had been destroyed so that no further sections could be made. Many sections were made of the remaining ovarian tissue of both ovaries in the last two cases but no other uterine tissue was found.

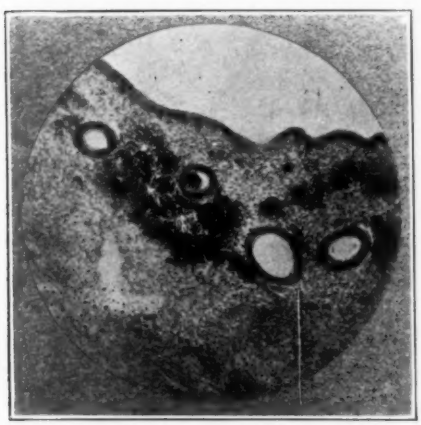

Fig. 6.—PATH. 4815, low power, showing the stroma and glands.

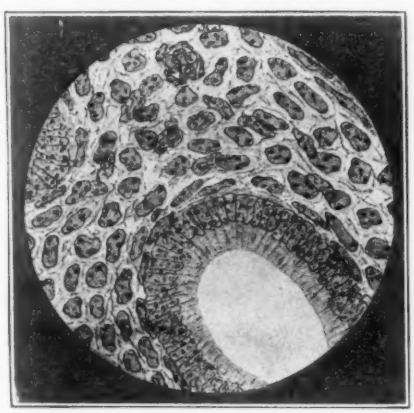

Fig. 7.—Semidiagrammatic drawing showing the characteristics of the uterine tissue found in all of the cases.

The differences between the three cases were very minor. In Case 2 the uterine tissue occurred on the surface of the ovary, while it was within the ovarian tissue in the other two cases. All of the cases showed minor histologic variations attributable to differences in the stage of the endometrial cycle, and congestion of the parts due to infection, prolapse, or accompanying conditions.

Besides those mentioned above, reported by Casler and Norris, I have been able to find only two other cases, one of which is extremely doubtful. In 1899 Russell[5] reported finding aberrant portions of the müllerian duct in the ovary. This occurred in an ovary macroscopically normal, but associated with tumor of the other ovary. The ovary contained a thick-walled cyst and in three areas in the cyst wall and solid tissue of the ovary, uterine tissue was found. It showed much

the same picture that I have described, and it definitely contained smooth muscle in a relative position corresponding to the muscular coat of the uterus. The other possible case was reported by von Franqué[6] in 1898, but in such vague terms and in such a loose way that it is impossible from his article to tell whether it actually belongs to this category or not. I believe it better to omit this case from the discussion, because we have no definite facts about it to discuss.

For comparison and contrast, then, there are three cases. Of a total of six, four occurred in ovaries that were macroscopically normal and were removed incidentally in an operation directed at some other condition. Two of them were associated with tumors in the affected ovary. The interpretation of these findings must lie between teratoma, metastasis and anomaly. Casler considers teratoma long enough to discard it as a possibility, and takes the position, with which I agree, that no teratoma confined entirely to uterine glands, stroma, and muscle has been hitherto described, and that its occurrence would be extremely improbable. The possibility of metastasis must also be considered. This would demand for a premise that an analogous tumor be present elsewhere and that it be malignant. In Casler's case the uterus had been removed some years previously for an "adenomyoma, with stroma, but no glands." Here we have the tumor, and it is conceivable that it might be malignant, in which case we could explain with ease the presence in the ovary of this uterine tissue. In Russell's case also there was a tumor, an adenocarcinoma of the other ovary, but it would be very hard to explain uterine tissue, anywhere, as metastasis from an adenocarcinoma of the ovary. In one of my cases there was a myoma showing the ordinary picture of myoma uteri, and here again it would be very hard to explain on the basis of metastasis from a smooth muscle tumor (even supposing it to be malignant) the presence in the ovary of this uterine tissue, whose chief characteristic was the glandular structure. In the case reported by Norris and in my other two cases there was no tumor at all, and it seems as if the metastasis hypothesis were entirely untenable in these cases. My own belief is that all of these cases can be most rationally explained on the basis of anomaly.

When it came to an explanation of the mechanism of this anomaly, I was entirely at a loss. Two suggestions were advanced by Drs. Bremer and Begg of the Department of Embryology of the Harvard Medical School. The former believed that this might be explained on the supposition of an accessory aberrant müllerian duct bud which was included in the ovary. Accessory tubes and ducts are not infrequently recorded and accessory ostia are often seen in embryos. Admitting for the moment that this explanation is correct, the advancing or caudal end of the duct is the portion which fuses

with the duct from the other side to form the uterus and vagina. If this portion were included in the ovary and continued to develop there, it would sufficiently explain the occurrence of endometrium. It is necessary to assume that this aberrant portion is an accessory duct for the reason that in each case there was a normally developed tube on the affected side. Dr. Begg suggested that the proximity of the "anlagen" of the ovary and tube in embryonic life was so great that there might be some critical period of embryonic development at which it would be possible for a tissue mixture to take place.

Casler does not advance a theory in explanation, but recapitulates that of Russell who argues that inasmuch as the epithelium of the tube and uterus and the germinal epithelium of the ovary are all originally derived from one embryologic ancestor, it is not too much to assume that tissue may develop structures in one place (namely,

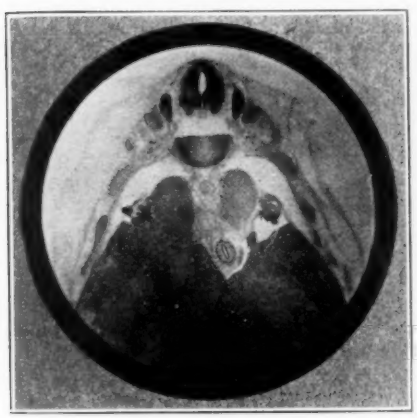

Fig. 8.—Human embryo 1597, 19.3 mm., serial section 704, 2 inch, showing the urogenital ridge on each side and the general anatomic location of all the embryologic illustrations.

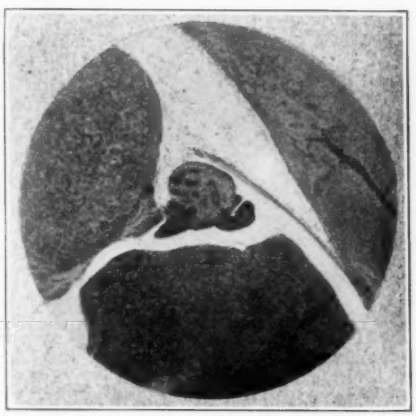

Fig. 9.—Human embryo 2044, 16.0 mm., serial section 928, right side, showing a small portion of the sex gland at the median side of the urogenital ridge and the funnel opening on the lateral side of the tubar area. The tubar and genital areas are usually separated by a cleft of considerable depth, which is absent in this section. Note the distance separating the genital from the tubar areas.

in the ovary) which its function is to develop elsewhere (in the uterus).

The only one of these theories which seems susceptible of experimental confirmation is that a tissue mixture may take place at some stage of embryonic development. With this idea in view, I have gone over the collection of human embryos at the Harvard Medical School. Of these 43 were available, ranging in size from 10 mm. to 50 mm. The others in the collection were either too young or otherwise unfit. The sex glands and ducts of the embryo are developed from the genital ridge which is on the surface of the wolffian body on either side of the midline. The genital ridge on each side is divided longitudi-

nally by a fissure which separates the genital area from the tubar area. The genital area gives rise to the sex gland, and the tubar area to the müllerian duct. The funnel arises in the tubar area as a dimple in the celomic epithelium, from which grows backward a solid cord of epithelial cells. This cord gradually becomes tubular, thus forming the müllerian duct. Its course is at first tailward, until it gets well below the crest of the ileum, then it turns sharply toward the midline where it meets its fellow from the other side, and the two then proceed tailward together to the cloaca. The anterior portion of the müllerian duct later becomes the tube while the portion which has joined (and later fused with) the duct from the other side forms the vagina, cervix, and uterus. This development of the müllerian ducts is at first the same in both the male and female. In later stages there are slight differences in the relations of the ducts in the two sexes, but these affect the portions which are associated with the

Fig. 10.—Human embryo 2155, 17.5 mm., serial section 930, left side showing the opening of the funnel on the median side of the tubar area.

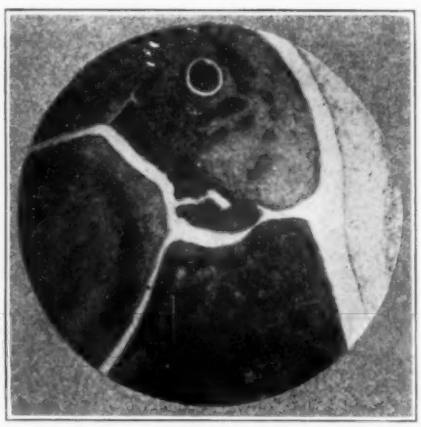

Fig. 11.—Human embryo 2155, serial section 948, right side, showing the opening of the funnel on the median side of the tubar area.

bladder or cloaca, and not the portions near the genital gland. The müllerian ducts finally atrophy in the male, with the exception of a small portion of the lower end, which opens into the urethra and forms the utriculus masculinus. (Figs. 8 and 9.)

In reviewing this series of embryos I have found cases where the funnel, instead of forming on the lateral side of the tubar area, forms on the median side, and is thereby brought into a position much closer to the sex gland, a fact which is suggestive in view of the supposition advanced by Dr. Begg.

The funnel, which is the earliest beginning of the müllerian duct, is developed usually on the lateral side of the tubar area and separated from the genital area by a fissure and the whole width of the tubar ridge, a distance of approximately 0.5 to 0.75 mm. In one case both

funnels opened on the median side of the tubar area. (Figs. 10 and 11.) In two other embryos one funnel opened on the median side, and in a fourth the funnel opening seemed to extend from the lateral through to the median side of the tubar area. (Fig. 14.) This unusual median position of the funnel reduces the distance between the genital

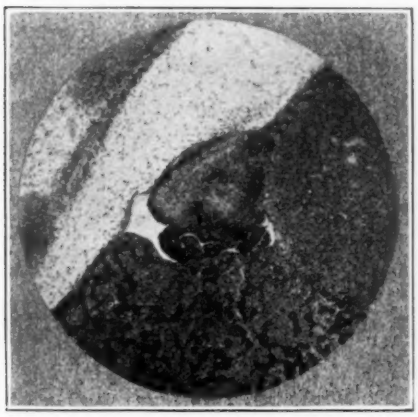

Fig. 12.—Human embryo 1913, 18.2 mm., serial section 919, left side, showing the opening of the funnel on the median side of the tubar area.

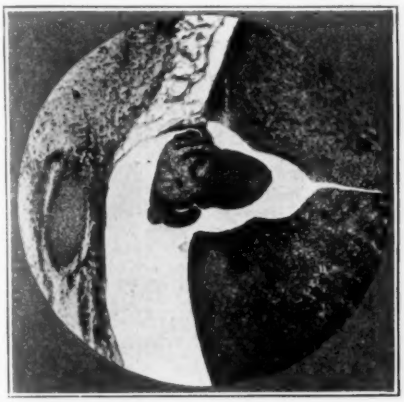

Fig. 13.—Human embryo 1597, 19.3 mm., serial section 704, left side, showing the opening of the funnel on the median side of the tubar area and its close proximity to the genital gland.

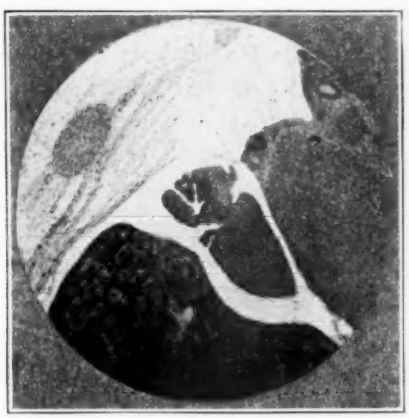

Fig. 14.—Human embryo 2042, 25.0 mm., serial section 1384, left side, showing the funnel with its tubal epithelium running through to the median surface of the tubar area.

gland and the müllerian duct very materially. In the cases which showed this variation the actual distances between the funnel and the genital gland at the nearest point were in four cases less than 0.1 mm. (about 0.0875 mm.) and in the fifth instance less than 0.2 mm. (about 0.175). It is not unreasonable to suppose that tissue mixtures between the tubal and ovarian tissue could take place in cases where the distance separating the two tissues is less than 0.1 mm.

I must note here that in the cases where this condition was present three of the embryos were too young to distinguish the sex with certainty. The genital glands were still undifferentiated. In the other two cases testes cords were present and the embryo was probably male. I do not feel that it would argue impossibility of such an explanation of uterine tissue in the ovary, had these been definitely male embryos, for there is nothing to show that such variations could not occur in the female. The most it could argue, I think, is that such an anomaly might some day be found in the testis also.

Recent experimental work in embryology has shown that certain tissues transplanted in fetal life to foreign parts of the same individual may grow and form comparatively well developed portions of their structures. Thus Lewis[7] has shown that in frogs the otic vesicle may be transplanted from one individual to another in early embryonic life and continue to grow normally, and other investigators have performed similar experiments with comparable results. We may believe, therefore, that a stray piece of uterine tissue in the ovary, even though it be eventually completely cut off from its origin, might go on and develop to a degree such as we have found in these cases.

The table shows a comparison of the six cases from various points of view. In the first place, the uniformity of age is of interest, though probably only incidental. In Russell's case the age in years is not given, but it is stated that the patient had reached the natural menopause. The gross appearance of the ovary is also worth noting. Four of the ovaries appeared grossly normal, one slightly enlarged, and one only showed gross tumor. This is interesting in view of Casler's suggestion that we might have in this anomaly another origin for tumors of the ovary. It would hardly seem, with the rarity of the condition taken into consideration, that this could be of any great practical importance in the genesis of ovarian tumor if only one in six of the cases show tumor at all. With regard to the rarity of the condition, the incidence of three cases in a series of 4853 is very high frequency for a condition that had been only once definitely described before August, 1920. I believe that it would prove more common if more searching microscopic examination of the ovaries was made in all cases, and the occurrence in most cases would probably take the form of small areas of uterine tissue in the walls of cysts. If this supposition be true, it would be an argument against Casler's idea, for many instances of this condition showing gross tumor formation cannot have been missed. It would logically mean, then, that the undiscovered cases would contain a much higher proportion of cases of harmless (if you will) uterine tissue in the ovary than of cases that have reached

any clinical significance, and that the true ratio of important to unimportant should be, not 1 to 5, but rather 1 to 50 or 1 to 100.

The matter of neoplasm occurring in connection with this condition has been already partially treated. Three cases showed no tumor of any kind in the genital tract. One case had had the uterus and adnexa, except the ovary in question, previously removed because of a diffuse uterine tumor. One case had adenocarcinoma of the opposite ovary, for which the operation was performed. A third had myoma uteri.

The question of functional activity of the uterine tissue is interesting also, in that three of the cases showed undoubted signs of menstrual activity of that portion of the endometrium which lay in the ovary. Casler's case after panhysterectomy continued to menstruate for part of a day every month. After removal of the ovary in question, it was found that there was dark blood in the cyst cavity into which these uterine glands emptied. Norris' case also showed blood in the cavity of the cyst, as did one of mine. Russell made no note in his report of any findings suggestive in this respect. Closely associated with the question of functional activity is that of correspondence of this tissue with the uterine mucosa itself in the stage of the menstrual cycle. Here again Russell does not note this fact. Casler cannot note it, for the uterus was removed four years previously in his case. Norris has remarked on the correspondence of the two tissues in his case, and in all of mine there was correspondence between the two. Case 1 showed in the uterus a marked hypertrophic condition which was not reproduced in the uterine tissue in the ovary. This hypertrophy was, no doubt, largely attributable to inflammation and congestion of the pelvic organs which caused more derangement of the circulation in the uterus than in the ovary. The mitotic figures and other finer evidence of the stage of the menstrual cycle, however, showed a condition in each case conformable with the interval stage. In Case 2 the patient had passed the menopause, and the endometrium showed a moderate senile atrophy which was present, but not so marked, in the tissue found in the ovary. In the third case the endometrium showed an early atrophic condition, which was not incompatible with the history of flowing (in the presence of the cervical polyp). The uterine tissue in the ovary in this case showed distinct atrophy.

The location of the uterine tissue is of some importance in relation to the theories advanced in explanation. In four instances the tissue was found within the ovarian substance, and so far as was demonstrated it had no connection with the surface of the ovary or the germinal epithelium. In Russell's case the tissue was both on the surface and within the ovary and in one of my cases was wholly upon the surface. In Case 1, here reported, there is possibility that the

TABLE I

CASE	GROSS APPEARANCE	AGE	NEOPLASM	FUNCTIONAL ACTIVITY OF OVARIAN ENDOMETRIUM	CYCLE CORRESPONDENCE	LOCATION OF UTERINE TISSUE	COMMUNICATION WITH SURFACE
1.	Normal	41	Small subperitoneal myoma uteri	Yes	Yes	Cyst within ovary ? surface opp. side.	None found
2.	Normal	48	No	?	Yes	Surface	.....
3.	Normal	44	No	No	Yes	Cyst within ovary	None found
Russell's	Normal	"Natural Menopause"	Adenocarcinoma other ovary	Not stated	?	Cyst and surface	.....
Casler's	Pathological	43	Uterus prev. removed for neoplasm, also ovary in question.	Probably	Uterus previously removed	Cyst within ovary	Not noted
Norris'	Slightly enlarged	29	No	Yes	Yes	Cyst within ovary	Not noted

tissue may have occurred in a cleft, in one of the ovaries. The two cases where the tissue is on the surface seem to favor the hypothesis advanced by Russell that they arose from anomalies of growth of the germinal epithelium. In the other four cases there was no apparent connection with the germinal epithelium, and in these cases it seemed more probable that Bremer's or Begg's suggestion is correct.

In conclusion then, we are dealing with a series of cases of a rare and interesting condition whose origin, we must admit, is not satisfactorily explained. All of the theories advanced are theoretically possible and for any of them concrete proof will be next to impossible. Embryology may be suggestive but hardly conclusive, for the reason that suggestive appearances in an embryo can never be proved to be the early stages of a condition found in adults unless all of the steps can be demonstrated, which seems unlikely in a condition of this rarity. Only if we are favored, like Mark Twain, to the extent of seeing St. Peter's skull at the age of seventeen and again in another museum at the time of his death, can we hope to bring forth actual proof by the aid of embryology.

With regard to the practical importance of the condition, I think we can agree that it is interesting academically, but as yet of unknown clinical significance.

NOTE: Since the preparation of this paper, several cases of the same sort have been reported by Sampson in a paper read before the American Gynecological Society, which appeared in *Archives of Surgery*, October, 1921. The discovery of endometrium in the wall in a large proportion of the so-called "hemorrhagic cysts of the ovary" would seem to bear out the opinion expressed in this paper that the condition under discussion is not of such rare occurrence as the scarcity of reported cases would suggest.

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205 BEACON STREET.

Society Transactions

AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS, AND ABDOMINAL SURGEONS. THIRTY-FOURTH ANNUAL MEETING HELD AT ST. LOUIS, MO., SEPTEMBER 20, 21, AND 22, 1921

(Continued from the January issue)

DR. M. PIERCE RUCKER, of Richmond, Va., read a paper on **The Action of the Commoner Ecbolics in the First Stage of Labor.** (For original article see page 134.)

DISCUSSION

DR. GORDON K. DICKINSON, JERSEY CITY, N. J.—In a paper which I recently read I quoted from Robertson's "Biochemistry," in which he stated that the colostrum had the same effect as pituitrin. It would be well if Dr. Rucker could verify that in some of his future experiments.

DR. ARTHUR H. BILL, CLEVELAND, OHIO.—I have been much interested in this problem for some time. In the last six months, an identical series of experiments have been carried on in the Cleveland Maternity Hospital by Dr. F. S. Mowry. There is not time to discuss in detail the findings of these experiments, but I wish to emphasize the fact that experiments of this kind are extremely valuable. We have observed clinically the effect of these drugs, but to have a very accurate picture of just what they will do in labor should prove of much value to us in practice.

DR. RUCKER, (closing).—I am indebted to Dr. Dickinson for his suggestion. In the action of the ergot the interesting thing would be to see whether the ergot is properly tested, and whether it is carried to absorption. I think we are led to put more dependence in ergot than it deserves. If it does not produce uterine contractions, why use it?

DR. GEORGE CLARK MOSHER, of Kansas City, Mo., presented a paper entitled **Ten Years of Painless Childbirth.** (For original article see page 142.)

DISCUSSION

DR. WILLIAM H. CONDIT, MINNEAPOLIS, MINNESOTA.—Every new measure or method brought before the profession has gone through three stages: introduction, exploitation, and conservative application. It appears as though we were in the stage of exploitation of the methods for relief of the pain of childbirth. We cannot teach the students these extreme methods, from hypnotism to the Potter operation. We employ methods which we think strike a happy medium; treat every case for delivery as a law unto herself and use morphine when indicated. We are happy with our results from gas, with an apparatus that permits the use of ether, if necessary. We do use pituitrin, but never in more than five minim doses. We

get short second stages and the patients come through with good results—we think, better statistical results—in the end. Why not take this happy middle ground instead of accepting some ground that we cannot feel absolutely sure of?

I was surprised to hear that Dr. Bill is not using nitrous oxid. We get very good results and never think of using chloroform.

DR. ROLAND E. SKEEL, Los Angeles, Cal.—Purely as a side issue Dr. Mosher's paper has brought out an interesting point in that he has abandoned morphine in favor of pantopon.

Shortly after Sahli made his observations upon the difference in the therapeutic effects of morphine and the combined hydrochloric acid soluble alkaloids of opium, we started on a series of clinical experiments to ascertain which was the more valuable as a surgical narcotic, inasmuch as opium had an undoubted stimulating effect upon the heart which morphine did not have. This was done by giving morphine and pantopon alternately to every operative case regardless of the nature of the operation or character of the anesthetic, and it was found that the patients having pantopon not only were more comfortable than the morphine patients but that vomiting was materially lessened after the former. In laparotomies this worked out in about the proportion of one to three, that is three times as many vomiting attacks followed the use of morphine as followed the use of pantopon as the pre-and postanesthetic narcotic. Since that time pantopon-atropine instead of morphine-atropine has been used almost without exception and if those who believe in a mixed narcosis will follow this plan in their gynecologic patients I am confident these patients will suffer less shock and have a more comfortable convalescence with much less nausea and vomiting.

Dr. Edward Speidel, Louisville, Ky., read a paper entitled **An Analysis of the Potter Version.** (For original article see page 150.)

DISCUSSION

DR. IRVING W. POTTER, Buffalo, New York.—Dr. Speidel has discussed version from three standpoints without endorsing the procedure.

I wish he had taken another course and given his own personal experience with it and either advocated or condemned it. We know it can be performed in the house or hospital. We also know that a small hand and arm are better than a large hand and arm. We know that the position of the patient is of importance and that the modified Walcher position is the ideal one to employ. As for the anesthetic, we have concluded that chloroform is the best and see no reason to change. We use it because of the rapidity with which the patients recover and because of the complete relaxation which is necessary in doing a version.

Of course the cervix must be obliterated and the os dilated. We wait until the parts are ready, it makes no difference whether it is half an hour or three days, provided the woman is comfortable.

We have found green soap to be a splendid lubricant and a splendid cleansing agent for the vaginal canal. This makes the parturient tract about as sterile as it can be made in that length of time. With plenty of green soap and plenty of time to dilate the vaginal canal, the hand can be introduced into the vagina without any danger. Then the ironing out process is begun and version is started. I still maintain that the left hand is the proper one to use. In that way the right hand is left for outside work, and the doctor should school himself to use only one

hand for the work in the uterus. When one hand has been introduced into the uterus it should not be withdrawn until the feet come along, in the average case.

There should be no time limit placed on this operation. The cord is not pulsating and has not since the baby has left the brim of the pelvis because there is pressure on it.

One of the effective points of this method consists in the delivery of the shoulders. As one of the shoulders rotates underneath the arch, the arm is being lifted up over the chest. The posterior shoulder is then brought forward by rotating the body. In that way you keep away from the rectum, avoid the tears which you formerly had, and, deliver both as anterior shoulders. What difference does it make whether the head rotates and comes through one or the other side of the pelvis? I think it is a mistake to deliver one shoulder posteriorly when it is the rectum we are trying to get away from. Another thing. These patients should not have an antepartum enema. If they do, you will have a liquid fecal matter distributed all over the field of operation, and that is wrong.

Now, who shall do versions? I do not believe the ordinary practitioner should rush in and do versions, but I think the men who are properly trained can do versions with benefit to the mother and child. I do not advocate, and never have, that the man who is seeing scarlet fever and diphtheria, and such things, should go and put his hand up in the vagina and uterus just as if he was putting it in his pocket. That is not fair to the man, the woman, or the method. I have done version in a great many cases and I have widened the field for the application of version, and I believe that I have avoided many complications by this procedure.

I work in Buffalo in many different institutions as there is no institution large enough to contain all of it. That makes my work scattered, which is unfortunate. Statistics are not reliable in all of those places. If there was but one large institution where the work could be done under the supervision of a certain set of individuals, it would be ideal. Last year I delivered over 1130 women and over 900 of them were version cases. This compares favorably with the preceding year, in which 1113 were delivered. My fetal mortality was 2.3 per cent.

I have tried for five years to bring before you a method that would stand up under opposition, and I submit to you these results. They are the best so far that I have been able to produce.

DR. M. PIERCE RUCKER, RICHMOND, VIRGINIA.—I have the honor of being one of Dr. Potter's early disciples. I started doing version, principally, because it saved the mother pain, and I became more enthusiastic because it saved the mother's perineum, and I became more enthusiastic still when I realized that it saved the babies. Men who have inquired into the deaths of babies during the first days after birth, find that a large percentage have cerebral hemorrhage, which may or may not be the cause of the death but it is a pathologic condition. Of 481 babies, 21 have come to autopsy, only 2 have shown signs of intracranial hemorrhage. One premature baby lived a few hours and died with a large intracranial hemorrhage, which, I believe, was due to pituitrin. One case had a contracted pelvis and a prolapsed hand. I did a version but had to force the head through the pelvis by brute force; that baby had a cerebral hemorrhage. The other 19 babies came to autopsy from enlarged thymus and other conditions, not intracranial hemorrhage. I think we must take this point into consideration in choosing the method of delivery. I believe if you follow up the babies for a year, you will find that the babies after easy births far surpass in their chances of survival those that have difficult deliveries.

DR. LEE DORSETT, ST. LOUIS, MISSOURI.—I had the pleasure of spending a few days with Dr. Potter and on returning home took up his method of version in some of my cases. I have not done it as a routine method of delivery, but in certain selected cases it has worked admirably. In occipitoposterior positions I think that it is the only method of delivery. I do not think that the Scanzoni or similar procedures have any place. Unless every step in Dr. Potter's technic is followed the whole method will be a failure.

It is my opinion that chloroform is the only anesthetic to be used. Ether is much slower, more of the drug is necessary, and its elimination is much slower. In abdominal cesarean sections where the resuscitation of the child is often necessary I have always noted that there is a strong odor of ether on the child's breath for some time after its delivery.

In regard to "ironing out" the vagina, Dr. Potter does not "spring" the vagina with two fingers, as some other men have taught, but inserts the whole hand within the vagina and, usually, spends from five to ten minutes in the process of dilatation.

As to bringing down both feet during extraction of the child, it has been my experience that it is often difficult to grasp both feet at the same time, so that I have been compelled to draw one foot through the cervix, then go after the other, and bring both through the vagina and vulva together.

In my work, so far, I have lost one baby in doing version. Looking back at this case now, I can readily see my mistake. The case was one of eclampsia in which labor was induced by the bag. As the patient was not doing well, having poor contractions and an alarmingly high blood pressure, I went through a partially dilated cervix and did a version; but the cervix contracted upon the after-coming head and the baby was lost.

I have been surprised when observing the perineum in the cases after delivery, to note how readily that structure "snapped" back in place. I have examined these cases from one to two months after delivery and in all of them the perineum was intact.

DR. O. H. SCHWARZ, ST. LOUIS, MO.—I have had the opportunity of seeing Dr. Potter at work in Buffalo, and there is no question that his method of version is admirable. If one is performing his version, it must be done in the minutest detail. I think doing it as a routine procedure is entirely wrong. One must remember that where conservative obstetrics is practiced, very admirable results are obtained.

I was very enthusiastic in employing version in cases of occipitoposterior positions, but before doing this I consulted the literature on the management of occipitoposterior cases. One of the first papers I consulted was that of Plass, published in 1916, in the Johns Hopkins Bulletin. The incidence of occipitoposterior position was 11½ per cent. He explains this low percentage by the fact that many cases were not examined until well in labor, and rotation had probably occurred in many instances. Operative interference was necessary in 22 per cent of 600 cases. The mortality was 4.02 per cent, including babies of 2500 grams and up. If we employ version in such cases, we must equal or better these figures.

We employ the Potter version in occipitoposterior positions in such cases where there is no progress within a reasonable time after full dilatation of the os. We use the method in preference to Scanzoni application and to application of forceps with the occiput transverse.

DR. ARTHUR H. BILL, CLEVELAND, OHIO.—Heretofore we have discussed the question of whether version is a proper routine procedure. This morning we are to discuss the method of delivery. It seems to me to be for the most part very

commendable. One or two steps which, in the hands of the average man, give trouble have not been emphasized.

In the first place, in regard to the delivery of the shoulders, I would like to suggest a slight improvement. It has been our practice to deliver the anterior shoulder first, and I think that is the proper procedure. Instead of putting the fingers in and sweeping the hand down, it is our practice to grasp the baby by the body, with its back to the front, draw it downward and outward in a direction opposite to the shoulder to be delivered, at the same time making a rotary movement. What happens is that the arm meets the resistance of the pubic arch, and is thrown across the chest, the shoulder, and usually the entire arm, being delivered by this movement without inserting the fingers into the vagina at all. Then by the same movement downward and outward in the opposite direction, the other arm is delivered. The advantage is that you do not need to insert the fingers into the vagina, and no traction is made on the arm.

Now, about delivery of the after-coming head. It has been stated that it makes no difference through which diameter of the inlet the head passes. It certainly does make a difference. I believe that many babies are lost in version because of this mistake. When the baby is delivered with its back to the front, we are drawing the occipitofrontal diameter of the child's head through the conjugate diameter of the inlet. The occipitofrontal diameter of the child's head in some cases is greater than the conjugate diameter of the pelvis, and hence there is difficulty in the extraction of the head. Before making traction on the child's head, if it lies in the anteroposterior diameter, rotate it to an oblique position, and then make traction; and, after it is through the inlet, internal rotation. Let the child's head follow the path it would follow in normal labor.

DR. SPEIDEL (closing discussion).—I am sorry to say I am not prepared as yet to follow in Dr. Potter's footsteps, by endorsing his version for every case. In a multipara with full dilatation of the os, who will easily deliver in fifteen or twenty minutes, with nitrous oxide or chloroform so there will be no discomfort in the second stage, I cannot see why such a baby should be turned, and the woman submitted to the risk of podalic version. I do say that there are indications for this version, and I cannot see why it should not be used in all face presentations. I think the majority of occipitoposterior positions should be delivered by version, and in breech presentations, the final steps should be as in the Potter version. I mentioned in my paper that the Potter version is easier than the old podalic version. But even in the hands of an expert this version is not easy. There is a decided nervous tension in such circumstances and none of us are absolutely sure that the baby is going to be born alive. The crucial point is the delivery of the after-coming shoulders and head; and Dr. Potter should be able to improve upon that.

I am glad Dr. Bill endorsed my suggestion that if the delivery is conducted according to the proper mechanism, this will make it easier. The shoulders should come down in the left oblique diameter, the head is then in the right oblique diameter and, consequently, it should be easier to deliver the shoulder and head in those diameters.

In regard to the indications: If it can be shown by postmortems that babies die of hemorrhage of the brain in normal deliveries because of a long-continued second stage of labor, then, of course, it is an indication for using this version; but if the hemorrhages only show themselves in abnormal cases it means that the version is indicated only in abnormal cases. Until you can show that these hemorrhages occur in normal cases, I am not prepared to follow Dr. Potter in using this version in normal delivery.

DR. JOHN F. MORAN, Washington, D. C., read a paper entitled **Treatment of Eclampsia; Then and Now.** (For original article see page 155.)

DISCUSSION

DR. E. GUSTAVE ZINKE, CINCINNATI, OHIO.—I congratulate Dr. Moran not only on the splendid manner in which he presented the subject, but also upon the change which has come over him in his method of practice. I have for years held that surgery has contributed absolutely nothing to the reduction of maternal or fetal mortality in puerperal eclampsia. The old saying of obstetricians of fifty and seventy-five years ago—"treat the convulsions and let the pregnancy alone"—is a good one; but, of course, there are exceptions. I regret very much that the treatment of puerperal eclampsia by veratrum viride has received so little attention, not only by the obstetricians of this country, but by those abroad. An eclamptic woman in labor, especially if the first stage has been completed, should be delivered as soon as possible; but an eclamptic not in labor, one in whom the seizures begin perhaps during the fifth, sixth or seventh month, is an entirely different matter. I have had cases and have seen cases in the hands of other men, which were seized with puerperal eclampsia during the sixth and seventh month, have three, four or five seizures, and then the attacks would cease and the patients go to the end of term and deliver themselves without difficulty.

Veratrum viride is the remedy par excellence in the treatment of eclampsia. If it is administered properly, in antiseptic preparation, it arrests the convulsions, the woman goes on to the end of term and in nearly all instances delivers herself. Eclampsia is, in my opinion, a strictly medical disease. Cesarean section and accouchement forcé are absolutely unjustifiable in the treatment of puerperal eclampsia in the absence of other indications. This has been the position I have taken for the last fifteen years and I have seen all the varieties of puerperal eclampsia. One fact should not be forgotten: Puerperal eclampsia may be produced by three causes, the most frequent is kidney insufficiency; the second, acute yellow atrophy of the liver; the third, which is the rarest, an apoplectic seizure which cannot be cured by any means. In other words, some cases are fatal from the start; no matter what you may do, they will die.

DR. JOHN O. POLAK, BROOKLYN, NEW YORK.—In the first place it seems to me that the proper treatment of eclampsia should be the preventive treatment. No matter whether we have adopted the surgical method of delivery or the expectant plan of treatment, which we have been using for the past four or five years, we have found that there is very little difference in the actual mortality. The eclamptic patient is an exceedingly bad surgical risk. Those of you who have seen these cases and have followed them through their convulsions have noticed that at first there is an increased leucocytosis and as the convulsions increase the leucocytic count falls. Those who are very toxic never have any increase in the leucocytes, which immediately condemns them from the surgical standpoint. The temperature increases with the convulsions and that, again, condemns them from the surgical standpoint.

I was "brought up" on veratrum viride and we used it with my former chief for years, and we were losing 18 to 20 per cent, and with the morphine method about the same. We cut it down for about a year to about 15 per cent but now it is about 20 per cent again. With the surgical method we lost about 21 to 23 per cent as an average over a period of several years.

Two classes of cases come to us, one in which the toxic effect is primarily exerted on the liver and the oxidation is not complete, the toxic material enters the

blood, acting as an irritant on the kidney. The other class presents a primarily sick kidney. I do not fear the latter as I do the fulminating type.

We have found that the blood pressure is the important thing in diagnosis. In making tests over many weeks we found that the hypopressure is characteristic of the normal pregnant woman. The moment there is a hypertension with relative increase, we are beginning to get into trouble, and a pressure of 130 is more dangerous and significant in the pregnant than in the normal woman. We find that the gradual increase of the blood pressure precedes by many days the toxic picture in either urine or blood. We are doing blood chemistry tests on every case, and nothing is so disappointing as this blood chemistry picture. There is nothing that gives us an early sign of what is happening in these women, so we have come to depend upon the clinical findings and the blood pressure rather than any other points.

DR. MAGNUS A TATE, CINCINNATI, OHIO.—So long as we do not know the cause, we are bound to have a variety of treatments for puerperal eclampsia. The essayist very forcibly spoke of prenatal care; and one of the most important things is blood pressure, as emphasized by the last speaker. Irving's statistics show very conclusively the value of the blood pressure, as a patient with a pressure of 180 is almost sure to have an eclamptic seizure. A valuable adjunct to the treatment of puerperal eclampsia is washing out the stomach and the flushing of the bowels, and, if necessary, repeated gavage.

I am sorry to disagree with Dr. Zinke about veratrum viride. I have tried it conscientiously for many years, but have given it up, because, I find it an extremely depressing drug, in some cases very dangerous, and the mortality from its use is very high.

I have never done an abdominal cesarean section for a case of eclampsia. I have never seen a case where I thought it was indicated. If the os is soft and dilatable, then I believe delivery should be forced. If the case be one in which the os is not dilatable but rigid, it seems to me, the expectant treatment is the best to follow.

Of drugs, morphia, in my experience, has given the best results, one-half grain to the dose, repeated as necessary.

DR. M. PIERCE RUCKER, RICHMOND, VIRGINIA.—I would like to ask Dr. Moran to tell us, in closing, if he has had any unfortunate experience with morphine. I will cite one case very briefly to illustrate what I mean.

Several months ago I had a patient who was taken with convulsions. We started morphine, stomach washing, irrigations, and so forth, and everything was going on nicely. The respirations were reduced to fourteen per minute and at 1:15 she got her last dose of ¼ grain of morphine. At 5 o'clock she suddenly stopped breathing and became livid. I pulled her over the edge of the bed and started artificial respiration and washed the stomach out again, thinking possibly some of the morphine was being reabsorbed. She became conscious and talked, but only three-quarters of an hour later had a similar attack. As soon as artificial respiration started her normal respiration I put her on the table and did a version. She woke up just as the head was being expressed and the case terminated very favorably for the mother and baby. The pulse went down to 88 or 90 although it had been around 150. The blood pressure was 130 fifteen minutes before she was taken with the attack.

Tweedy, I believe, emphasized the fact that a case of eclampsia should not be left in the charge of anyone but an obstetrician, and I think this case demonstrates that fact.

The patient received 1¼ grains in four hours. I have given as much as 5 grains

in seven hours without bad effect, and would like to get Dr. Moran's idea of the cause of this reaction in this particular case.

DR. JAMES E. DAVIS, DETROIT, MICHIGAN.—I would like to ask Dr. Polak in regard to his experience with the blood chemistry findings, whether he has come to the conclusion from the negative or positive phase of the findings that blood chemistry is of no use.

He surely does not wish us to infer that when a patient in the latter months of her pregnancy changes from a normal non-protein nitrogen to 50 or 60 mgm. per 100 c.c. of blood and shows also a creatinine increase, that such a finding is not a reliable guide.

DR. POLAK (replying to Dr. Davis.)—What I meant to convey was that I expected to find a constant evidence of retention in these repeated blood chemistry examinations. Where we find an increase of creatinine or nitrogen that always indicates to us a bad prognosis. We never carry that case along, but I have been disappointed in the fact that we do not find the constant changes in the blood which correspond to the clinical picture and the blood pressure readings.

DR. MORAN (closing the discussion).—I much prefer to bleed outwardly than to bleed inwardly. Therefore, I do not use veratrum viride. I am in thorough accord with the gentleman who discussed the dangers of veratrum viride. It is a purely depressant drug and when it is once used it is hard to combat its effect. Of course, you can bleed to any point you wish and get the blood pressure down to any desired point. Our purpose in not carrying the pressure below 150 is this: If we wish to give an anesthetic or to operate we do not want it too low, so we bring the pressure to 150 or thereabouts.

As to Dr. Rucker's question about the morphine, I am rather inclined to think that the quick reaction was due to something other than the morphine. Otherwise, the patient would not have so quickly recovered. As to massive doses I am always careful in giving morphine to watch the patient and the effect. I have seen one fourth grain of morphine given without my order by an interne reduce the respirations to six, and the interne was very uncomfortable. In giving any drug we should carefully watch the effect to see just what that particular patient needs. One-fourth grain of morphine is all that is necessary for one patient, while two grains may be required for another. In cases of coma we do not need morphine at all. In conclusion, I want to emphasize again the importance of prenatal care.

As to the blood pressure, I mentioned that the eyegrounds were examined because of the increased blood pressure. I consider it the most valuable of all the signs we have. The urinary findings come late but the blood pressure is significant and on examination of the eyegrounds you will very often detect a retinitis, and that the patient is in the danger zone. In the two cases of fatality reported in the paper, I am sure if examination of the eyegrounds had been made weeks before and the blood pressure checked up it would have been of inestimable value and I believe those patients might have recovered.

DR. JOHN O. POLAK AND DR. THURSTON S. WELTON, Brooklyn, N. Y., presented a paper on **A Study of the Origin of Bleeding in Ectopic Pregnancy.** (For original article see page 164.)

DISCUSSION

DR. HERMAN E. HAYD, BUFFALO, NEW YORK.—Dr. Polak has emphasized the importance of the corpus luteum in connection with this problem. Anything that

explains to us the complex and complicated methods of creation is, of course, especially interesting. The essayist has shown us how a tubal pregnancy is practically the same as a corporeal, except that in the one a better decidua is formed and better implantation; while in the tube it is distributed more irregularly. I think he is justified in the conclusions he has drawn, that the hemorrhage is consequent not only upon the peristaltic action of the tube, but also upon some endocrine influence.

Perhaps some of you have seen the reports of the work of a veterinary in Danbury, Connecticut, where there was a splendid herd of cattle on a stock farm, but only thirteen viable calves were born in a year. He found upon investigation that these cattle were infected with a virulent coccus similar to the gonococcus, and as a result there was a peritonitis and a subacute salpingitis and oöphoritis with thickened covering and as a result, the corpus luteum could not rupture. These animals did not therefore "come into heat" and no young were born. By injections into the vagina, massage and friction, he succeeded in breaking these graafian follicles, and they let loose their unabsorbed corpora lutea, and every one of these animals within eighteen to thirty hours came in heat and became impregnated. Now, when this man made a mistake and found that some of these animals he was massaging were already impregnated, he produced a terrific intraperitoneal hemorrhage or an abortion within twenty-four hours, showing that the corpus luteum had much to do in these hemorrhages.

Dr. Polak has brought out the fact that these uterine hemorrhages are a symptom, and they will continue no matter what kind of conditions are opposed to them in the way of treatment, so long as that corpus luteum exists in that ovary.

THE NEW YORK OBSTETRICAL SOCIETY. MEETING OF NOVEMBER 8, 1921

THE PRESIDENT, DR. RALPH H. POMEROY, IN THE CHAIR

DR. ONSLOW A. GORDON presented a report on a case of **Uterine Torsion in Pregnancy with Fatal Results.**

This unusual case was admitted to the Gynecological Department of Bellevue Hospital, April 28, 1921. I am indebted to Dr. Holden for the privilege of reporting this case.

History.—A. B., twenty-seven years of age, a negress, married for ten years. Her chief complaints were pain in the lower abdomen and an abdominal tumor. Her family history was irrelevant as to her present condition. Her previous history—medical and surgical—was negative. She was the mother of four children, the youngest three years old. All deliveries and puerpera were normal. There were no miscarriages. Her menstrual history began at fourteen years, was always regular every 28 days, flowing profusely for 4 days without pain. Her last regular period was in December, 1920. She was constipated, had marked frequency of urination and thought her urine contained blood.

Her present illness began several weeks prior to her admission to the hospital. She first noticed a dragging pain in the abdomen and slight vaginal bleeding. Her bleeding has not been constant. Her abdominal pain was located in both lower quadrants, was dull and continuous and had been increasing in severity for several days prior to her admission. She had noticed a gradually increasing abdominal tumor for about two months. She had considered herself pregnant but denied any intrauterine interference.

On admission, she had a profuse and foul-smelling leucorrheal discharge.

Physical Examination.—A markedly distended abdomen in a thin and emaciated patient. There is a plainly palpable tumor mass, apparently arising from the pelvis and extending several cm. above the umbilicus. This mass is regular in outline and resembles in size and shape the body of a pregnant uterus about the fifth month. There are several hard and nodular masses plainly palpable about the upper portion of this mass. The mass is only slightly tender and there is only moderate abdominal rigidity.

Vaginal examination shows a long, soft cervix dilated to about two fingers. The uterus seems to be drawn up out of the pelvis and is enlarged to about the size of a five months' pregnancy. There is no bulging in the fornices. There is a profuse and putrid bloody vaginal discharge.

A provisional diagnosis was made of pregnancy with macerated fetus and possible fibromyoma uteri.

Clinical History.—The patient presented the usual picture of puerperal sepsis. Temperature upon admission was 102.3° per rectum and pulse 130. She gradually became weaker and, on the fifth day after admission, she was transfused with 750 c.c. of blood. She died on the following day, six days after admission, presenting the usual picture of a severe puerperal sepsis with peritonitis.

Autopsy Report (Abstract).—The abdomen is very prominent. A mass is felt in the lower portion of the abdomen, extending upward to about 1 inch above the umbilicus. On section, the subcutaneous fatty layer is scant. The peritoneum is cloudy throughout. The intestines in the lower portion of the abdomen are con-

siderably matted together and are plastered to a large tumor mass which occupies the center and lower portion of the abdomen.

The uterus is large, extends above the umbilicus and seems to be twisted on itself so that the left ovary comes around in front and is adherent to the uterine wall in the midline anteriorly; whereas the right ovary is behind the uterus and to the left. The musculature is black in color, especially near the fundus of the uterus. In this place, the walls are very thin. The cervix is considerably elongated and forms a hook-like projection below and slightly to the left side of the mass of the uterus.

On opening the uterus from the cervix, the canal goes upward to the left of the main mass of uterine tissue for about 3 inches and then turns to the right to enter the main portion of the uterine cavity.

The placenta is attached to the left inner side of the uterine wall. There are two hemorrhagic areas in the middle of the placenta, each being about 1 inch in diameter. The female fetus is about 6 inches in length and gangrenous throughout.

Conclusions.—This case presents primarily the interesting question of spontaneous torsion of the uterus. It is our opinion that this woman became pregnant, developed sepsis and peritonitis, aggravated by the spontaneous torsion of the uterus. I do not believe that the torsion of the uterus produced either the sepsis or the peritonitis.

Torsion of the uterus to a marked degree is a decidedly infrequent pathologic state. Schultze reviewed the literature prior to 1907 and found 32 cases reported of which 13 were caused by myomata, some without pregnancy and some associated with pregnancy and 17 by ovarian cysts. In 2 cases, torsion of four complete turns is recorded. There is no case on record of actual gangrene of the uterus or peritonitis, resulting solely from torsion.

Extreme torsion is nearly always associated with pregnancy which permits hypertrophy and relaxation of the round ligaments. Slight torsion is physiologic in pregnancy after the fourth month when the fundus has risen above the pelvic brim.

The rotation is only possible above the cervix because of the fascial attachments below the internal os.

The etiologic factors usually present in cases of torsion are:

1. An infantile type of uterus, giving a long cervix as an axial point about which torsion may take place.

2. A large pelvis and a partial faulty position of the uterus which may be increased by severe intestinal peristalsis.

(As I have previously stated myomata, ovarian cysts and tumors and pregnancy are usually present.)

The diagnosis of torsion is practically never made except at operation or autopsy. Intense bladder disturbances with, possibly, blood in the urine are frequently noted and may be suggestive. This is probably produced by traction upon the vesical fascia.

DISCUSSION

DR. WILLIAM M. FORD.—I would ask that Dr. Gordon suggest, in closing, what the origin of the sepsis might have been, or whether that is still an obscure cause of the rotation of the uterus.

DR. H. N. VINEBERG.—One cannot very well criticize this case although I recall a similar instance about seven or eight years ago, in which the patient with a miscarriage at four or five months, had a sloughing fibroid. She was seen by several eminent gynecologists and told that an operation would mean sure death. When I saw her she had a temperature of 105° F., a coated tongue, pulse 140

and was semicomatose, but still I thought she should be given a chance. I had the patient transferred to Mount Sinai Hospital and operated on that night. The next morning she presented an entirely different picture. She was bright, had recovered consciousness, the temperature had dropped to 102° F., and she made a good recovery. Of course that patient was in pretty good general condition. She was well nourished, and although her pulse was rapid, it was fairly good. It seems to me, on general principles, that the patient on first coming to the hospital (I understand she was there six days) should have been given a chance, because the peritonitis, I feel, was only secondary, and if the uterus had been removed early, I believe she might have recovered.

DR. EBEN FOSKETT.—The records of Bellevue Hospital will show one case of fibroid of the uterus with torsion, which also resulted in death. That was in Dr. Studdiford's service. She came in with severe shock and a distended abdomen and the case was looked on as one of an acute abdominal condition and the operation was begun. The abdomen was found full of serous fluid, which was rather dark in color. This was evidently due to the shutting off of the circulation by the torsion. The patient died on the table.

DR. ONSLOW A. GORDON, JR.—As to Dr. Ford's question about the cause of the sepsis: we quizzed the patient carefully at the time she was admitted as to any induction of abortion or interruption of pregnancy and she denied that she had had any. I presume the sepsis was spontaneous, as it may be. She had a macerated fetus in a five months' pregnancy, and many cases of spontaneous sepsis arise in that way.

As to Dr. Vineberg's question as to why we didn't operate, I would say we made a diagnosis on admission that the patient was septic and it is not our policy to operate in sepsis and remove the uterus.

DR. HARVEY B. MATTHEWS presented a case of **Bacillus Welchii Blood Stream Infection with Autopsy Report.** (Case Report to be published.)

DISCUSSION

DR. EMIL SCHWARTZ.—The cases are not very rare, but they are always very interesting. The question is as to just where the infection comes from. Dr. Matthews outlined the various habitats of the bacillus Welchii, and it is only fair to assume that a large number of them are probably from the bodies of the patients themselves, since most individuals carry the bacillus Welchii in their intestinal contents. It is just a question whether a search of the literature would not show that in practically all, or almost all of the cases there was some surgical interference. The streptococcus has been found in cases of bacillus Welchii infection. Where the case had surgical interference, it is very well possible that the patient was the carrier of the bacillus Welchii and was infected at the time of the surgical operation. Cases have been reported where a premature labor was induced under most favorable conditions in large hospitals and the gas bacillus later on killed the patients. I remember one clinic where that happened twice in six months on the induction of premature labor. In both cases gas bacillus infections occurred; so apparently it is either that the infection was taken from the floor or from the surroundings in the hospital, or that the patients were unfortunate enough to spread it into the operative cavity or otherwise.

DR. GEORGE L. BRODHEAD.—We have had two fatal cases of gas bacillus infection on the Harlem Hospital service, both after abortion (I do not know whether it was artificial or not), and the characteristic symptom in both of these cases which gave us a clue to the diagnosis, was the very intense bronzing of the skin. Both cases terminated fatally and both occurred after jaundice.

DR. J. MILTON MABBOTT.—I want to refer to a case I reported about twenty years ago before the Medical Society of the State of New York under a title that I had to coin myself of "pneumogalactocele," with an unidentified bacillus. The bacteriology was done under the supervision of Dr. Harlow Brooks, and it is a question whether there could be a localized infection by the bacillus aerogenes capsulatus in one breast only, where there were no other serious symptoms, and where, after aspiration of gas and milk, an incision was promptly followed by recovery.

DR. WILLIAM M. FORD.—May I qualify the observation made by Dr. Brodhead with my own observations in a limited number of cases of gas bacillus infection? I refer to the bronzing of the skin. Most of the cases I have had an opportunity to see, followed traumatisms involving skin wounds and had the characteristic bronzing of the skin, but it did not appear to me to be a general bronzing. It rather appeared as an extension from the site of the wound. In each instance it traveled very rapidly from the wound like an erysipelas rash. Following the bronzing of the skin, which was quite distinctly marked and limited, was the crepitation in the subcutaneous tissues. One of these infections followed an operation for inguinal hernia in which every ordinary aseptic precaution had been taken. The patient was a Greek waiter and I suppose his skin was infected from his rectum.

DR. GORDON GIBSON.—There is one thing in Dr. Matthews' paper to which I think we should take exception, and that is the treatment by expectancy. I think that is possible only if the infection is general. It is unfortunate that you cannot spot infection in the uterus unless you have a blood culture, for while the infection is in the uterus, radical operation is the only hope.

DR. RALPH H. POMEROY.—I noted Dr. Schwartz's reference to the occurrence of bacillus Welchii infection where premature labor had been induced.

Some three years ago I had a very disturbing experience with a case of that kind, in which the labor in an elderly primipara was induced in an effort to prevent her from going too far over time. After the vagina was flushed with lysol solution and with the patient under an anesthetic the membranes were stripped back through a one-finger cervix; the patient developed a gas bacillus infection, resulting in the death of the child (delivery of a dead fetus) and eventually, a week later, the death of the mother. That experience is cited just to point out the difficulties of being sure of what we can do in the way of dealing with the cervix even under conditions that we suppose are perfectly safe.

I might say that although a number of these cases have been reported, the bacteriologic diagnosis has not always been made. A clinical diagnosis is all that has been made in most instances. Dr. Brodhead did not say that he had cultured any secretions or found the Bacillus Welchii in the blood, or in the contents of the uterus.

In regard to the bronzing of the skin; I spoke of the bronze color, but thought it was better to call it a deep jaundice. The sclera of the case reported tonight was so jaundiced that you could hardly tell her eyes from the surrounding skin.

Dr. Gibson's suggestions as to the expectant treatment may or may not be well taken. His point of making a diagnosis early and doing a hysterectomy seems

to me questionable because, even then, you are opening up a great many channels for infection; you are leaving blood clots in which B. Welchii thrive; there is always some, and there may be a great deal of destruction of tissue in doing a hysterectomy, and we know that these organisms grow best in dead tissue. I was in hopes I could find a case in which some one had done a hysterectomy, but they seem to be afraid to do it and in my opinion they are right.

DR. WILLIAM SIDNEY SMITH reported a case of **Double Pyelitis Complicating Pregnancy at Sixth Month.**

This case is presented with the hope that it may provoke some discussion as to the value of catheterizing the ureters and instilling a silver salt in the kidney pelvis.

This patient was a fragile, pale primipara of twenty-eight years, with a negative past history. She came under observation during the third month of pregnancy, complaining of vomiting and loss of weight. The urine contained acetone and diacetic acid, but there was no albumin, no casts or pus. The blood pressure was low, 98/60. Appropriate treatment relieved her symptoms. The urine became normal, she was able to retain nourishment and there was a slight gain in weight.

At the end of the fourth month the patient went to the seashore and felt so well that she went in bathing. That evening she noticed some chilly feelings. During the days that followed, chilly feelings and one or two degrees of temperature occurred every afternoon. Nausea and vomiting with loss of strength again appeared. Urinalysis was reported normal.

At the beginning of the fifth month the patient again came under supervision and was sent to the Hospital, complaining of moderate nausea, with aching pain in both lumbar regions and general weakness. Heart, lungs and extremities were normal. Abdomen was slightly distended and there was tenderness in both lumbar regions. Blood pressure was 110/68 on admission, T, P, R, 99° - 100 - 20. Catheter specimen of urine showed a slight cloud, sp. gr. 1015, trace of albumin, no sugar, trace of acetone and diacetic acid. There were a moderate number of pus cells, no casts. Blood examination showed a hemoglobin 50 per cent, red cells 2,912,000, white cells 12,200, polys 89 per cent, small lymphocytes 8 per cent, large lymphocytes 2 per cent, transitional cells 1 per cent.

A diagnosis was made of pregnancy complicated by a pyelitis and toxemia. Urotropin was given and appropriate treatment for toxemia was carried out.

During the following week the patient had a chill and sweat nearly every afternoon, temperature ranged between 99° and 104°, pulse between 90 and 120. Blood pressure remained fairly constant at 110/64. In spite of treatment the gastric symptoms became worse and weakness increased. The patient looked sick. On the days when she would eat and take alkalies the acetone and diacetic acid in the urine would clear up. Casts were not present at any time and clumped pus cells with a trace of albumin were constant. The white cells increased to 17,400, with 83 per cent of polymorphonuclears. On the eighth day after admission both ureters were catheterized and cystoscopy done. The bladder mucosa was moderately congested, vault somewhat depressed by a gravid uterus, ureter orifices normal in appearance. Catheters passed readily to kidney pelvis, with free urine flowing from both pelves; on the right side the flow was intermittent and rhythmic, on the left side the flow was steady (suggesting some degree of hydronephrosis). Phthalein was recovered from the right kidney in 12 minutes and from the left in 12 minutes. Three c.c. of 25 per cent argyrol was instilled into each kidney pelvis.

The right kidney urine contained many red cells and large clumps of pus cells, no casts. Left kidney urine contained large number of clumped pus cells. No casts. Cultures of this urine reported sterile, but a culture from a subsequent catheterized specimen from the bladder showed B. coli. It was negative for typhoid bacilli. Wassermann reaction was negative. The CO_2 combining power in 100 c.c. of blood was 502; creatinine, 1.48 mg.; urea, 25.89 mg.; sugar, 127 mg.

The patient was profoundly ill, listless, abdomen markedly distended. After consultation we decided to empty her uterus. We hoped that the gastrointestinal symptoms and her general condition would improve and so give the kidney condition a better chance to clear up. I decided to have a blood transfusion done just before doing a vaginal hysterotomy.

Before operation the hemoglobin was 50 per cent, red cells 2,835,000 and white cells 26,800 with 92 per cent polymorphonuclears. Blood transfusion (citrate method) with 600 c.c. of blood and in addition 250 c.c. of normal salt solution. The operation was difficult owing to a small vagina, a long rigid cervix and a relatively good sized fetus. The patient stood the operation very well. Four hours after, her hemoglobin was 68 per cent.

The convalescence was slow, but steady and uneventful. The gastrointestinal symptoms began to improve at once. Appetite gradually returned and food was taken and retained. Chills ceased and temperature and pulse returned to normal. Strength, however, was relatively slow in returning. The acetone and diacetic acid disappeared at once after operation and the pus gradually cleared up. The patient left the hospital on the 33rd day after operation with a clear urine and feeling well except for general weakness.

DISCUSSION

DR. H. D. FURNISS.—In a great many of the cases of pyelitis there is a history of exposure to cold and chilliness, but in analyzing those cases I am in doubt whether they were chilled and had their trouble as a result of that, or whether the chill was an early evidence of the infection.

I believe a great many of these cases can be saved from hysterotomy and that they can be carried on to full term by proper treatment (pelvic lavage). This can be done as gently and with as little discomfort as an ordinary catheterization. With the use of the single catheter cystoscope there is no irritation, and very little, if any, discomfort to the patient. It is not an operating room procedure. The patient can be turned crossways in bed, put on a douche pan and the lavage done with very little trouble.

After a hysterotomy, or emptying of the uterus, a great many patients become better, but they are not necessarily cured for often they are going to be just as bad off as before.

To protect the kidneys, I think it is essential that they be properly drained and drained frequently.

In the washing out of these cases where there is hydronephrosis or hydroureter, the pelves should be thoroughly emptied and washed out with boric acid or sterile water to get rid of the urinary salts before instilling the silver nitrate.

It is also important in these cases to drain off the silver afterwards because of its caustic effect. It has recently been noted that the destructive effect of the silver on the epithelium lasted a week before new cells replaced the old.

The strength of the silver makes very little difference. The silver coagulates the albumin in the superficial layers, so 5 per cent has very little more effect than 1 per cent. Clinically, 5 per cent gives more reaction than 1 per cent. If you protect the bladder with salt solution there is no vesical irritation.

The results from pelvic lavage are so good that I feel no uterus should be emptied because of cystitis until such treatment has been tried.

DR. WILLIAM A. JEWETT.—It has always seemed to me in these cases of pyelitis complicating pregnancy that the most important thing is the question of the drainage of the kidney pelvis. In some this can be accomplished at this stage of gestation (about 6 months) by posture, having the foot of the bed elevated, and if the pyelitis is unilateral, having the patient turned to the opposite side, taking the pressure off the lower end of the ureter. We have treated some cases by washing them out with boric acid. We have also used silver nitrate. In certain cases we have used simple drainage of the kidney pelvis; that is, passing catheters on either side or on the affected side and leaving them *in situ* two, three or four hours so as to maintain drainage. In those cases we usually have a reduction in the severity of the symptoms, and there is also usually a reduction in the temperature. This procedure can be repeated at intervals, and, personally, it seems to me we get just about as good results by draining without irrigation as we do in the cases that have been irrigated.

DR. REGINALD M. RAWLS.—There is one thing which has been left out, and that is the method of treatment, and in order to make that plain I will cite a case under my care this summer in the Woman's Hospital. A woman came in five months' pregnant with apparently a surgical abdomen. The abdomen was extremely tender, the entire right side, from the umbilicus up to the point of the gall bladder, being involved. The case was running a temperature between 103° and 104°. The abdomen was very tender. The diagnosis she was sent in with was of pregnancy with acute appendicitis. The blood count showed a rather high polynuclear count. The urine was absolutely negative (bladder specimen), not a trace of pus, no albumin, no casts, normal specific gravity, reaction acid; and I was very careful to examine her for one point that I have never seen fail, and that is tenderness in the costovertebral angle. She was extremely tender on one side. She was seen in consultation by three or four men and the diagnosis ranged between ruptured appendix, or gall bladder. The patient was prepared for operation. I felt sure it was a case of pyelitis, although everything seemed against the diagnosis. She was to be operated on at 2:00 o'clock in the afternoon. About 11:00 o'clock that morning I called up Dr. Bugbee and asked him whether he would see the case. I told him I was afraid she was too ill to be cystoscoped. He saw the case with me and stated that there was no indication from her urine that she had any trouble but he decided to cystoscope her, with the result that the left kidney showed absolutely normal urine. The right kidney was entered with some difficulty and the urine returned was full of pus. He washed out the pelvis of the kidney on that side. That kidney pelvis was washed out but once and the specimen collected showed the presence of pure colon bacillus. She was at once placed in the Fowler position and given alternating doses of 10 grains of urotropin and two hours later 30 grains of monobasic sodium phosphate. The patient's temperature did not again rise above 101°, and in about five days was normal and the symptoms absolutely subsided. She was kept on urotropin in 7½ grain doses with 15 grains of acid sodium phosphate for 2 months. When I saw her last she was seven months' pregnant. She had never had a return of her former symptoms. In that particular case the washing out may have relieved the obstruction, but most of these infections, as we know, are bloodstream infections. The source of that infection was absorption from the gastrointestinal tract. By giving her acid sodium phosphate with urotropin we created a bactericide and thereby eliminated the infection.

Another case developed about the third or fourth day with high temperature and afternoon chill. She was sent to the Cystoscopic Clinic and it was demonstrated that she had a pyelitis. She was put on acid sodium phosphate and urotropin. In two days the temperature dropped to normal. In the course of time she reported again to the Cystoscopic Clinic. They are very much opposed to using urotropin and put her on methylene blue. After three days she had a recurrence of her trouble and she was put back on acid sodium phosphate and urotropin, with cessation of her symptoms.

I found by actual experiments that 50 per cent of cases in which urotropin is given alone, it is excreted as such, and that is the substance which causes the irritation. However, if you give the patient acid sodium phosphate you obviate the element of irritation. The only complication is occasionally a little diarrhea.

DR. ALBERT M. JUDD.—As I understand it, the causative factor in these cases is the colon bacillus which will develop only in an acid urine. Therefore, why would it not be just as well to alkalinize the urine so we would not have a urine in which the colon bacillus could develop? I have had cases get well under this treatment.

DR. HAROLD BAILEY.—As regards emptying the uterus, it seems to me that a woman with a pyelitis might have this done in a more simple manner, namely, by using a bag. You are going to have a pyelitis when you get through. I wonder whether it is a suitable procedure to do a hysterotomy in such cases. I noted in the paper that Dr. Smith described the cervix as long and narrow, and I think that is the reason he elected that procedure.

On the other hand, the treatment by catheterization, in speaking of which Dr. Jewett, I think, struck the keynote, although it was brought out by the reader of the paper, provides the drainage. It does not make very much difference what we irrigate with or if we irrigate with anything. As a matter of fact, no one claims that the silver kills the bacteria. It shrinks the mucous membrane and gives better drainage. There is no cleaning out of these individuals by washing out the pelvis of the kidney with 1 per cent silver nitrate. We let these cases go time and time again and the fever drops. We had a case that was seven months' pregnant with a temperature of 103°, and the moment she emptied herself the temperature dropped, but she is not well. She will probably pass out of our control and it may be three or four months before she has another attack. These patients should be turned over to the urologist for care. The mere instilling of a little silver nitrate during the acute attack does not cure the patient and only favors drainage.

DR. ALBERT M. JUDD.—May I call attention, Mr. President, to the fact that one gentleman drains his patients by raising the head of the bed and the other by raising the foot of the bed?

DR. WILLIAM S. SMITH.—This particular patient was drained by raising the head of the bed. The uterus was emptied, very largely because she was ill with her gastrointestinal symptoms. She was rapidly growing weaker. Forty-eight hours had made a very great difference in her general condition. She was not taking food, and we came to the conclusion that she could not stand it very much longer and unless we rid her of her pregnancy she would die. I did a hysterotomy rather than induce and let her have a spontaneous labor, which was discussed, because I felt that was the easiest and quickest way.

DR. EDWIN G. LANGROCK read a paper on **Pituitary Extract at Beginning of the Third Stage of Labor—A Report of 100 Cases.** (For original article see page 170.)

DISCUSSION

DR. GEORGE L. BRODHEAD.—When Dr. Ryder read his very interesting paper a year or so ago, Dr. Langrock and I determined to carry through a series of 100 cases to see how closely our figures would approximate these given by Dr. Ryder.

First, in regard to the method that was used: Williams in his discussion of hemorrhage in 1,000 cases of spontaneous labor placed a bed pan under the patient at the end of the second stage and kept it there until the placenta was delivered and for some little time afterwards. In our series as soon as the child was born, a basin was placed under the buttocks of the patient and was kept there until the placenta was removed, at which time another basin was placed, because we wished to ascertain the blood loss during the third stage as well as the blood loss following the birth of the placenta. The work was done a good many times under the direct observation of Dr. Langrock and myself, hence we believe that it was very carefully done and the statistics are reasonably accurate.

In our series the average blood loss was 177 c.c., which is very close to the figures of 180 c.c., given in Dr. Ryder's paper.

It is interesting to note that in the 200 cases in this and Dr. Ryder's series only four women lost 600 c.c. or more of blood, whereas, as Dr. Langrock pointed out, in the 1,000 cases reported by Williams, there was a loss of 600 c.c. or more in 130 cases, without pituitrin.

There is one point which I think we must consider. Is it possible that in giving 1 c.c. of pituitrin, if we do it often enough, we are eventually going to have a rupture of the uterus? Personally, I have not seen it, but Dr. Langrock has given me permission to report a case that I saw in consultation with him of rupture of the uterus after the birth of the placenta, apparently due to the administration of 1 c.c. of pituitrin. This patient was a multipara and Dr. Langrock reached the patient's house about thirty minutes after the birth of the child. The patient was in splendid condition. After making preparations to remove the placenta, the latter was easily expressed by Credé. He then gave her 1 c.c. of pituitrin and in a very few minutes the patient had a very sharp pain and had to have two doses of ¼ grain of morphine to quiet her. Her pulse rose to 120 or 130 and she was acutely ill. She evidently had a rupture of the uterus. When I saw her with Dr. Langrock she had a distinct mass reaching from the pelvis to the left lumbar region, apparently a very extensive hematoma. Dr. A. A. Berg who saw her later, agreed in the diagnosis of rupture of the uterus, and said that if she was operated on she would undoubtedly die. Several days later a large abscess opened in the fornix of the vagina and the patient made a slow, but complete recovery.

I see no reason why we should not in a long series of cases with a dose of 1 c.c. of pituitrin get a rupture of the uterus, although as to this I am frank to admit that I really do not know if such a thing is possible. However, this case of Dr. Langrock's, with the uterus empty, calls our attention to the possible danger from the use of pituitrin. I hope that in the course of the discussion if any one has had a rupture of the uterus in the third stage of labor (following the use of 1 c.c. of pituitrin) or knows of any, he will report it.

DR. GEORGE H. RYDER.—The series of cases in which pituitrin was given as a routine in the third stage of labor, is very interesting to me because of a similar series, tried at the Sloane Hospital, and reported by me last January.

Before speaking of this series, however, I would like to ask Dr. Brodhead a question in regard to the case that he reports, in which he says a rupture of the uterus took place after the administration of 1 c.c. of pituitrin, at the end of labor, that is, with an empty uterus. How did he make the diagnosis of the rupture? Is he sure that there was one? Is he sure that the woman did not have a pus tube that was ruptured? Up to this time, for years, it has been considered entirely safe to give pituitrin or ergot with an empty uterus; and I think we should always accept with reserve any unusual occurrence which tends to change such an idea, founded on such long and universal experience.

Referring to the series of 100 pituitrin cases reported in the paper, there are two things of which I wish to speak.

First, concerning the occurrence of hour-glass contraction of the uterus, after the administration of pituitrin in the third stage of labor. Since reporting in January the 100 cases of pituitrin in the third stage of labor, I have had an hour-glass contraction of the uterus, where pituitrin was so given. The case is interesting. The woman had what we call an irritable uterus for four days preceding labor. During all this time she was having irregular pains, which did not disturb her greatly, and which allowed her to sleep under small doses of morphine at night, and which caused practically no change in the dilatation of the cervix. At the end of this time, she went into normal labor, and was delivered by an easy low forceps operation. One-half c.c. of pituitrin was given four minutes after the birth of the baby. At the time it was given, the fundus was very hard and well contracted. Following this an hour-glass contraction of the uterus developed, and the placenta could not be expressed. Under ether it was extracted manually without difficulty. Looking back on this case, I think it was unwise to have given the pituitrin in the third stage. How much, if anything, the irritable uterus had to do with the hour-glass contraction, I do not know. At any rate, the fundus was already hard and well contracted. It seems possible that the pituitrin given with the uterus already very firm might have been responsible for the hour-glass contraction following. This experience has caused me to modify my technic in the use of pituitrin. Since then, where the fundus remains well contracted, no pituitrin is given till after the birth of the placenta. Where the fundus begiss to soften and balloon or where there is hemorrhage, one-half c.c. of pituitrin is given, usually from four to five minutes after the birth of the baby, and another half c.c. immediately following the birth of the placenta. The idea is that the first dose holds the uterus firm until the second is given, and this continues the effect until the ergotole begins to exert its effect, which is not for nearly half an hour after. In this way, there is a continuous effect on the uterus to keep it contracted. Whereas if only the ergot or ergotole is given after the third stage, there is nearly half an hour elapsing before there is any such effect.

In speaking of hour-glass contraction, however, it is well to remember, as has been said, that it sometimes occurs where no pituitrin has been given. I have delivered one woman twice, at an interval of two years, and each time she had an hour-glass contraction of the uterus, with no pituitrin given. So it is not at all certain that the hour-glass contraction, in the pituitrin series, came from the pituitrin.

The second thing concerning which I wish to speak in the series reported, is that of undue hemorrhage in four cases mentioned. It seems to me that at least in one of these cases as reported, the hemorrhage might have been due to the fact that the placenta was not extracted soon enough. I think the statement was made that the doctor in charge waited an hour, with considerable bleeding taking place, and then extracted the placenta manually. I would say that this fact, and not the administration of the pituitrin was responsible for the bleeding. The other three

hemorrhages may have had a similar cause. I believe a great many postpartum hemorrhages are due to this very cause—waiting too long with active bleeding before taking energetic measures to stop it. And I agree with the statement that bad postpartum hemorrhages are usually due to poor obstetrics.

It is very interesting to note that in both of these series, of 200 cases altogether, there is so little hemorrhage. But as the reader of the paper says, the giving of pituitrin in the third stage of labor, pleasing as the results may be, does not allow us to relax altogether our watchfulness of the uterus, during and after the third stage.

DR. GEORGE W. KOSMAK.—The resort to pituitrin in an attempt to cut down the amount of hemorrhage during and after labor is of some interest. Personally, I have never been able to comprehend its purpose. As I understand the physiology of the third stage, the uterus alternately contracts and relaxes until the placenta has separated, and that normal physiological contraction and relaxation, it seems to me, should not be interfered with because it provides for a proper and complete separation of the placenta. In giving pituitrin, especially in the comparatively large doses in which it has been administered in these cases, I believe we interfere with natural processes.

The amount of blood which is lost in an ordinary labor does not seem to harm the woman any and I think Williams showed very clearly in his series of cases that she could lose a comparatively large amount of blood and replenish it in a short time after delivery.

In view of the fact that pituitrin is such an uncertain thing and that different women react in different ways to the same dose, I personally believe it rather bad teaching to recommend pituitrin as a routine adminisration. I am very glad to hear Dr. Ryder, who has had a great deal of personal experience with these cases state that he does not administer pituitrin where the uterus is firmly contracted. I think the recommendation should be advanced with a great deal of caution, and it is a relief to hear Dr. Brodhead say that there is danger of uterine rupture where it is given, even after the child is out of the uterus.

DR. SOLOMON WIENER.—It has always been a surprise to me that any fixed amount of pituitrin should be mentioned as a dose. It has been my experience that in some patients you will get more of a reaction with 3 minims than in others to whom you give 1 c.c. You cannot tell beforehand what reaction you are going to get in a given patient, unless she has had a previous test, and it seems to me that that is one of the very important points in forestalling danger in using pituitrin. I have seen some patients who could get as much as three doses of 1 c.c. each inside of an hour with as little effect as if it were just that much water, and, as everybody knows, there are other patients who get a terrific contraction from a dose of 3 or 4 minims.

It is not a question of dosage only but also of the preparation.

The point is that it is necessary to individualize. One must begin by administering a small dose of any given preparation of pituitary extract. When one has learned the reaction of that particular patient to the preparation used, one can then if necessary proceed to give the larger doses.

DR. EDWIN G. LANGROCK.—The patient with the rupture of the uterus was a para ii who awakened her nurse stating she had very slight pain in the back. The nurse suspected the onset of labor, and although the patient had asked her not to call the doctor, the nurse went to the phone and while she was talking to me the patient had another uterine contraction and the baby was born. It was probably thirty-five or forty minutes before I arrived.

The patient was in good condition, and the placenta was very easily removed by a Credé. I made it a routine to give 1 c.c. of pituitrin immediately after the uterus had been completely emptied. Before getting this at least three-quarters of an hour had elapsed, during which time the patient's color was good, and her general condition excellent. Immediately after the administration of the pituitrin she had a terrific pain in the left lower quadrant. I watched her for a few minutes. The pulse rate kept going up. She looked sick. She had a peculiar ashy facial expression, not a pallor. We gave her ¼ grain of morphine and in a half-hour she was given another ¼ grain. In the four or five hours following this one could map out an increasing flatness in the left flank, which suggested a retroperitoneal hemorrhage. Whether she had a rupture of a varicosity in the left broad ligament or a rupture of the uterus, I did not know. If you can get a rupture of a varicosity in the broad ligament after the administration of 1 c.c. of pituitrin, we do not advise giving it. I did not make a vaginal examination. Dr. Berg, however, did a vaginal, and felt a rent in the uterus. This hematoma finally broke down and drained through the vagina and she made a good recovery.

I stated that in all probability, had the placentae in our bleeding cases been removed sooner, the patients would have been saved some hemorrhage.

Ergot is always given to these patients as a routine.

In answer to Dr. Kosmak, I would say that we did not recommend the use of pituitrin at the beginning of the third stage indiscriminately. We are simply giving the results of what happened in our series of 100 cases.

As far as a fixed amount of pituitrin goes, I would say that what Dr. Wiener states is perfectly correct.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

Toxemia of Early Pregnancy: Etiology and Treatment*

Part I. Etiology

BY PAUL TITUS, M.D., F.A.C.S., PITTSBURGH, PA.

A REVIEW of the extensive literature on toxemia of early pregnancy and of the ingenious theories which have been advanced to explain toxemia occurring either early or late in pregnancy, is the best demonstration of the fact that no single idea is sufficiently comprehensive to cover this unquestionably complex matter.

For the purpose of study it has seemed advisable to divide the subject of pregnancy toxemia into two parts, thus enabling one to consider toxemia during early pregnancy first and alone. There are many reasons for such a division, chief among which are the facts that there is a distinct difference between the clinical pictures presented at these two times, as well as an actual difference in their pathology. At the same time there is a problematic relationship between toxemia early and late in pregnancy which makes an absolute separation of the one from the other a difficult if not an impossible matter. Stone, and later Ewing, advanced the idea that pernicious vomiting, acute yellow atrophy of the liver, and eclampsia originate from the same source, namely through a metabolic and pathologic disturbance in hepatic function, and that they are therefore essentially the same. Williams disagrees with this viewpoint, maintaining that metabolic study of the urine and blood, as well as histologic examination of tissues obtained at autopsy, clearly indicates that essential and characteristic differences exist between the various conditions thus grouped together. He believes that each clinical entity should be studied separately and that to group them even under such a heading as that proposed for this review serves merely to becloud the issue.

GENERALIZATION OF ETIOLOGIC THEORIES

Certain unknown toxic substances are supposed to be elaborated somewhere in the metabolism of a pregnant woman. The presence of

*Part II to be published in May issue.

these substances in the body is considered to be the cause of vomiting and the pathologic changes which result if the diseased condition is prolonged. While Zweifel has summarized fifteen different theories as to the cause of toxemia late as well as early in pregnancy, Underhill and Rand point out that there are four main theories as to the source of these toxic substances.

The first is that they are of gastrointestinal origin and akin to an ordinary autointoxication; the second, that they occur as the result of disturbances in the various glands of internal secretion, notably the ovaries; the third, that they are of fetal origin; and the fourth, that they result from disturbance in liver and kidney metabolism and function.

I. THEORY OF AUTOINTOXICATION

Dirmoser was the first to assert that these toxins were the result of intestinal putrefaction, and LeLornier elaborated this idea by the opinion that the condition is due to a placental toxemia plus a deficient bowel action. There can be no question that the bowel plays a part in toxemia of pregnancy for it is the main avenue of excretion, and while it may not have an active part in the actual production of all of the toxins, it most assuredly has a real rôle in the elimination of putrefactive poisons.

McDonald feels that the trouble originates in digestive faults in the duodenal region and employs "duodenal enemas" in its treatment. Tweedy, likewise, inclines to the view that manifestations of toxemia result from the appearance in the blood of a foreign protein which interferes with the normal food antibodies. The nausea and vomiting, he says, are Nature's attempt to get rid of food which cannot be assimilated and neutralized. In close connection with the idea that gastrointestinal autointoxication plays a rôle, there is the opinion of Albert that bacterial action as found in an infectious endometritis may produce absorbable toxins, while Talbot observes that a definite focus of infection in such places as the teeth, the tonsils, the sinuses, or the ears is practically always to be found as an underlying cause of toxemia. DeLee agrees that some focus capable of throwing infection into the maternal blood-stream often becomes a menace to the life of the fetus, and for the past twenty years he has been suspicious that an infection will be found at the bottom of eclampsia.

II. INTERNAL GLAND SECRETION THEORY

Lange, and also Nicholson, attack the problem on the side of the glands of internal secretion and are confident that the trouble is due to the occasional failure of the thyroid to enlarge. Foulkrod, as well as Ward, claim exceptional results from the administration of thyroid extracts.

The Italian writers have done considerable work in the glandular theory, and Cerecedo, as well as Zulogoa, feel that adrenal insufficiency is the true factor in hyperemesis gravidarum, and that if this defect be remedied the condition promptly clears up.

American readers, in particular, are familiar with the group who believe that toxemia of early pregnancy results from a deficient corpus luteum secretion. This idea was expounded by Hirst and the administration of corpus luteum extract was adopted with great enthusiasm only to meet with many disappointing failures. A large number of the successful results, on the other hand, were obviously due to the psychical and suggestive effect of the treatment combined with the generally sensible management of the patient by regulation of diet and bowels, and rest in bed.

III. FETAL SOURCES OF TOXEMIA

That the toxemia is of fetal origin is plausible and has many adherents. In general, the line of reasoning has been, that such toxemia is peculiar to pregnancy, and resulting from the presence of the fetus, must therefore be due to certain unknown fetal products. These may be serologic or metabolic, according to various observers.

Many conjectures have been made on the serologic aspect of this question. Veit believes that both the transportation and the dissolution of syncytial elements of the placenta which may have made their way into the maternal blood stream, have a toxic action if they are not combated by antibodies in the patient's blood. Cary writes that he thinks the growing ovum acts as an antigen and stimulates the host to form antibodies but the host occasionally has a lowered immunity to the growth of the syncytium and unless the patient is fortified by something such as desiccated placenta, the vomiting occurs. Austin holds the same general idea but believes that up to the time the chorionic villi are developed into placenta, their syncytial cells secrete poison which is dumped into the mother's blood stream. Rubeska also gives credence to this theory.

Elaboration of the thory of anaphylaxis gave rise for a time to hopes that it might offer an explanation of toxemia during pregnancy, especially in connection with eclampsia. Further serologic studies seem to have discredited the idea, in spite of its having been supported by such men as Thies and Lockemann, Gräfenburg, Rosenau and Anderson, Lawrance and others. Obata has shown that the extract of normal placenta is as toxic as that of an eclamptic placenta and that no significant difference exists in the toxicity of serum from individuals of different groups. Furthermore, he has demonstrated that the neutralizing power of blood to the toxic property of placental extract is not increased during pregnancy, hence there is no evidence

of an immunologic origin of a neutralizing power of the blood. Zweifel claims that there is no basis for the theory that toxemia—especially eclampsia—is the result of a hypersensitiveness on the part of the mother for fetal or placental proteins, since he has been unable to sensitize animals for homologous fetal and placental proteins.

IV. THE EFFECT OF HEPATIC, RENAL, AND OTHER METABOLIC DISTURBANCES

The metabolic viewpoint of this subject opens a tremendously broad and interesting field which is as yet far from completely explored. It links up closely with the gastrointestinal theory in the idea that the extra waste products of fetal metabolism thrown into the maternal blood stream cause an undue and unaccustomed strain on the mother's eliminative powers, thus producing a kind of autointoxication. This is not quite consistent, however, with the fact that the first evidences of toxemia are usually manifest early in pregnancy, after which there is a period during which the pregnant woman is fairly free from the likelihood of toxemia, followed by the interval of the later weeks when preeclamptic toxemia and eclampsia are prone to develop. The same fetal waste products are being thrown off into the maternal blood current in steady progression and with no remissions during the entire pregnancy.

Acidosis has been suggested by Zweifel as a cause of toxemia, but Van Slyke and Losee have demonstrated by a depletion of the alkaline reserve, that acidosis does not exist to any particular extent. It exists mildly even in normal pregnancy and is profound only in the last stages of toxemia. Otherwise, it never occurs to the same degree as in nephritis or diabetes and therefore may be considered merely as a symptom rather than a cause of toxemia.

Disturbances in hepatic and renal metabolism undoubtedly play an important rôle in toxemia. The recognition of hepatic lesions in fatal cases of toxemia has been established by Stone, by Ewing, and by Williams, but the cause of these lesions is still obscure. The fact that identical pathologic changes in the liver have been found in vomiting of pregnancy, chloroform, phloridzin, phosphorus, and arsenic poisoning, as well as in simple but complete starvation has been repeatedly emphasized.

Stone's theory of "suboxidation" based on his work in the "nitrogenous partition" of the urine was partially accepted by Ewing, but seems to have been disproved by the subsequent investigations of Van Slyke and Losee.

The work of Williams on the ammonia coefficient, especially from a prognostic standpoint in pernicious vomiting of pregnancy, has attracted wide-spread attention. Briefly his contention is, that the relation of ammonia nitrogen to the total nitrogen in the urine varies in normal pregnancy between 4 and 5 per cent, whereas in toxemic

vomiting it rises to as much as from 20 to 50 per cent. Given a case of vomiting, therefore, he considered that a differentiation between neurotic and toxemic vomiting lay in the ammonia coefficient. Later his views underwent a slight modification in that he came to consider a low ammonia coefficient indicative of neurotic vomiting and therefore of negative value, whereas a high coefficient meant either a true toxemic vomiting which required immediate abortion, or that the starvation incident to prolonged vomiting of neurotic origin had produced the altered relation between the ammonia nitrogen and the total nitrogen. His procedure then was to undertake forced feeding whereupon the ammonia coefficient of the latter would fall, whereas that of the former would show no change for the better. Williams' work was sharply attacked by Underhill and Rand who considered the high ammonia coefficient merely an accompaniment of inanition and in no way connected with a toxemic process. Williams refutes their claims by such clinical methods as the presentation of a patient whose ammonia coefficient fell promptly after an abortion before she had been given any food. He still holds to the opinion that toxemic vomiting of pregnancy is either neurotic or toxic in origin and type.

Hepatic lesions are so constant in toxemia of pregnancy that liver involvement is indisputable. One important question which remains to be decided is whether or not a disturbance of liver function and metabolism is alone responsible, or if it be a combination of a specific and as yet unknown toxin elaborated by the fetal tissues acting in conjunction with an impaired liver. In such a review as this it is difficult not to intrude one's personal and possibly biased opinions. With this as a half-hearted apology it is desired to outline what seems to be a logical and consistent explanation of the rôle of the liver in the origin and progress of toxemia of pregnancy, at the same time admitting the point that the clinical and pathologic differences in the various toxemias of pregnancy intimate the elaboration of unknown and differing toxins which are able to seriously affect the patient only when the liver is already impaired.

The liver has several functions, of which two have a direct bearing on this subject. It is the carbohydrate storage organ of the body, maintaining a reserve supply of glycogen which can be drawn upon as needed in the general metabolism, and is also the great detoxicating organ of the body, being called upon to vigorously combat the effect of any poisons either ingested, or elaborated within the body. Direct starvation results in a drain upon the reserve glycogen stored in the liver, and likewise an unusual and prolonged demand for glycogen, to be consumed in the body metabolism, effects a similar glycogen depletion of the liver.

When the liver is not well stored with glycogen, it is far less able

to perform its various functions, and its ability as a detoxicating organ is markedly impaired. This has been demonstrated by the experimental work of Roger, who tested the effect of various poisons on starving animals and found the lethal dose to be considerably smaller than for normal control animals. He also found that poisonous substances are less toxic if administered simultaneously with glucose. Davis, Hall and Whipple have found that yellow atrophy of the liver can be produced far more readily in experimental dogs which have been deprived of carbohydrates even though proteins have been allowed, and similarly that the ingestion of carbohydrates in various forms caused the central necrosis of the liver lobules in poisoned dogs to disappear much more rapidly than in control animals. They have thus been able to demonstrate a remarkable regenerative ability on the part of the liver.

Slemons has shown that the growing fetus makes a demand for carbohydrates far in excess of that of normal life, since the fetal tissues synthesize their protein from the material in the fetal blood, and that practically all of this nutritive diffusion from maternal to fetal blood streams takes place in the form of sugar. The mechanism by which a steady flow of glucose toward the fetus is maintained is explained by his finding that there is a higher mean glucose value on the maternal than on the fetal side. Lockhead and Cramer have shown that the fetus not only uses, but also stores, glycogen, the placenta acting in this capacity until the fetal liver can take up this function. Glinke and others have found that glycogen is especially abundant in fetal tissues, while McAllister has demonstrated that glycogen, present in the uterus and tubes independent of pregnancy, is most abundant at the time of childbirth, also being especially marked in the placenta.

Glycogen consumption during pregnancy translated into muscular energy would place a woman in the situation of running a nine-months long Marathon race usually without preliminary training. It is to be expected that her liver would become more or less depleted of its glycogen stores, unless constantly replenished by the proper kind of food, whereupon it promptly becomes less and less able to cope with any toxins in the system, be they merely metabolic or actually and specifically developed by the fetal tissues. With such disturbance in hepatic function by carbohydrate starvation, whether this be direct or indirect, and the establishment of nausea and vomiting, the food intake is lessened, so that a vicious circle is readily produced.

This "carbohydrate deficiency theory" as elaborated first by Duncan and Harding, and independently by Titus, Hoffmann and Givens, offers a simple explanation of certain peculiar facts pertaining to toxemia of pregnancy. It accounts for the occurrence of nausea and vomiting

with such regularity in early pregnancy when the chorionic villi are especially abundant, since the chorionic tissue has been shown to be the glycogen demanding and storing portion of the fetus; it also accounts for the frequency of toxemia in hydatidiform mole and twin pregnancies where there is an unusual amount of chorionic tissue, so that the occurrence of pernicious vomiting and eclampsia in hydatidiform mole with no fetus present becomes the expected rather than the inexplicable thing; it explains the success to be obtained in vomiting of pregnancy by forced feeding and frequent meals; the reason why the restriction of such proteins as meat and eggs has been found empirically to be of value in toxemia is clarified on other grounds than a mere reduction in toxic waste products of protein metabolism; the similarity between the clinical symptoms and the pathologic lesions in the liver in starvation as compared to toxemia of early pregnancy is thus explained; on a purely physiologic basis the "carbohydrate deficiency" or "glycogen depletion" theory establishes fairly well the reason for individual resistance to the toxins which may be assumed to be present in every pregnancy, whether these be the "syncytiotoxin" of Weichardt, and Veit, or the "fibrin ferment" of Schmorl, and Dienst, or entirely unrelated to these theoretical toxins of pregnancy.

The disturbances in renal function seen so regularly in all profound toxemia of pregnancy may be merely incidental, precisely as in the case of any such toxemia as that of scarlet fever, pneumonia, bichloride of mercury poisoning, and so on. Even eclampsia occasionally is unaccompanied by nephritis, and Prutz concluded from a study of a large number of autopsies following death from eclampsia that it was unjustifiable to consider renal lesions as the anatomic substratum of eclampsia despite the frequency of their occurrence, assuming that they might well be secondary in the majority of cases.

In connection with the hepatic insufficiency idea there was a significant piece of work recently published by Mann of the Mayo Clinic. He, too, has demonstrated that the liver is able to regenerate rapidly even after surgical removal of as much as 70 per cent of its bulk. He has been able to remove the entire liver from dogs after having established a collateral circulation at a preliminary operation. The animals first develop muscular weakness, then fine muscular twitchings appear which increase in severity until definite convulsions occur, during one of which the animal dies. He concluded from his first work that there seems to be some change in metabolism whereby some intermediate toxic product is formed, or some necessary element for metabolism is lacking. In a further study, Mann and Magath found a progressive fall in blood-sugar after total extirpation of the liver and coincidently a decrease in glycogen content of the muscle. The

first symptoms occur coordinately with this decrease in blood sugar, but if, during any stage after symptoms develop up to the point at which respirations have actually stopped, glucose is injected, the animal immediately and completely recovers. This process can be repeated many times before the animal finally dies with its blood sugar then not below normal. Transfusion of blood and saline were without effect, and no other substances than glucose, except maltose and galactose, produced this restoration.

Four main sources of possible trouble, as outlined above, have been carefully considered by innumerable investigators, and one after the other of these factors has been accused with neither conviction nor acquittal. Since each has been under suspicion it is by no means impossible that some combination of these various forces may be responsible for toxemia of early pregnancy.

The one tangible thing which stands out in all toxemia of pregnancy is that the liver is definitely involved, although it is not quite clear whether this involvement precedes or results from the toxemia. Knowing that liver lesions identical with those of vomiting of pregnancy may be produced by simple starvation, and that in early pregnancy a specific starvation results from the unusual demand for glycogen made by the fetus, it is logical to assume that this at least starts the trouble. Presently all the complexities of disturbed metabolism may be involved, and with the liver functions already disturbed and impaired, it requires very little imagination to complete the vicious circle.

The products of fetal metabolism which to an individual with an unimpaired liver would be harmless, may have a definitely toxic effect, although it is still possible that they would be without effect until combined with some such gastrointestinal disturbance as that following indiscretions in diet or a period of constipation. The interrelationship between the liver and the pancreas and spleen might play a rôle, while the thyroid and adrenals may even be involved.

Liver disturbance is, however, the constant factor in all this, and the way in which such disturbance may be instituted by the occurrence of a pregnancy can be outlined upon a rational physiologic basis, namely, the sudden and unaccustomed demand of the fetus for glycogen depletes the liver of its reserve sugar, whereupon its various metabolic functions are profoundly upset. What goes on thereafter is still a matter of conjecture.

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Selected Abstracts

Physiology and Pathology of Menstruation

Morley: The Corpus Luteum of Menstruation and Pregnancy. New York Medical Journal, 1921, cxiii, 230.

This article is a review of a monograph published in 1851 by John C. Dalton, Jr., a work of considerable historical interest.

Dalton observed a series of eighteen carefully controlled cases at postmortem, eleven illustrating the corpus luteum of menstruation and seven that of pregnancy. He believed that ovulation and menstruation occurred synchronously though the precise time at which the rupture of the follicle occurred was not definitely ascertained. Shortly after the rupture of the follicle, the formation of the corpus luteum commences. He described its development in detail and mentioned also the fact that at the end of the third week from the close of menstruation it begins to retrogress.

The corpus luteum of pregnancy on the other hand arrives more slowly at its maximum of development and afterwards remains for a long time as a very noticeable tumor, instead of undergoing a process of rapid atrophy.

The corpus luteum of pregnancy retains a globular or only slightly flattened form and gives to the touch a sense of considerable resistance and solidity. Internally it has an appearance of advanced organization, which is wanting in the corpus luteum of menstruation. This

gives the difference in the thickness of the convoluted wall of the two corpora lutea as a point in differential diagnosis. A more dusky and indefinite color is characteristic of the corpus luteum of pregnancy. If the period of pregnancy is at all advanced it is not found like the corpus luteum of menstruation in company with unruptured follicles in active process of development. MARGARET SCHULZE.

G. Schickelé: Studies on Ovarian Function. Gynécologie et Obstétrique, 1921, iii, 171.

From observations made in 28 cases operated upon for various gynecologic conditions and amplified by reports of other authorities the writer draws the following conclusions: Ovulation may take place at any time from the beginning of one menstruation to another; the time of predilection would seem to be the week following menstruation, (17 in 36 authenticated cases); ovulation may take place during menstruation, but it more frequently takes place between the menstrual periods. As regards the relationship between the corpus luteum and menstruation, observations on 18 cases are tabulated, giving the time of the observation from the beginning and end of the last period, the type of menstrual rhythm, the condition of the corpus luteum and the condition of the uterine mucosa, and the following conclusions are drawn:

1. During the week preceding menstruation, the ovary often harbors a corpus luteum, but the corpus luteum will not always be found in the same phase of evolution. 2. One may find a corpus luteum at the height of its development in the week following menstruation. 3. During the week preceding menstruation the uterine mucosa often undergoes a change characterized by a hyperemia and a well marked glandular secretion. This change is not limited to the premenstrual period. One may find it during the week following menstruation. 4. Thus a corpus luteum in evolution will often be coincident with a uterine mucosa in a stage of change. This coincidence will occur more often during the week preceding than during the week following menstruation. In spite of the coincidence, the degree of development will not be markedly the same for the corpus luteum and the uterine mucosa.

Above all, the metamorphosis of the mucosa can take place without a corpus luteum, and a corpus luteum in a state of evolution may not force the uterine mucosa to metamorphose in its turn. Thus the corpus luteum and the uterine mucosa are reciprocally independent. 5. It is certain that menstruation may take place in spite of the absence of a corpus luteum. R. T. LAVAKE.

Tschirdewahn: Ovulation, Corpus Luteum and Menstruation. Zeitschrift für Geburtshilfe und Gynaekologie, 1920, lxxxiii, 110.

The author states as his conclusions that in every healthy woman, one, or more rarely two follicles ripen periodically. Rupture of the follicle occurs from the 10th to the 26th day after menstruation, varying with the individual and also in the same individual. The ovum is received in the ampulla of the tube, there casts off its polar bodies and if it is not fertilized becomes disintegrated in 2-3 days. While the ovum is passing through the tube, the ruptured follicle is developing into a corpus luteum. Through action of the hormones, which have

perhaps already been produced by the theca lutein cells, the uterine mucosa undergoes predecidual or premenstrual changes. After several days the fertilized ovum which has meanwhile been nourished by its deutoplasm arrives at the uterine mucosa, burrowing into it by the corrosive action of the outer trophoblastic layer. If this happens, the corpus luteum persists to exert a trophic influence on the uterus and its contents. If the ovum is not fertilized, the corpus luteum begins to retrogress. At the same time retrogressive changes occur in the predecidual mucosa and menstruation takes place. Ripening of new follicles, which has ceased while the whole blood supply was nourishing the corpus luteum, begins again and the process is repeated.

MARGARET SCHULZE.

Loeb: Effect of Undernourishment on Mammalian Ovary and the Sexual Cycle. Journal American Medical Association, 1921, lxxvii, 1646.

Loeb reviews the results of his work on this subject which has appeared in various publications.

He demonstrated by animal experiments that excision of the corpora lutea accelerated ovulation, while burning them did not do so, on account of the accompanying "tissue shock" to the rest of the ovarian tissue. This was evidenced by the slow growth of the follicles which had a tendency to become atretic when half developed. He next found this hypotypical condition in guinea pigs which had remained sterile for a long time and concluded that underdevelopment is one of the causes of sterility. Looking for a cause of these hypotypic ovaries, he found it possible to produce them artificially by undernourishment. He was able to demonstrate definite changes in the ovaries after six or seven days of underfeeding, but the results varied with the age and previous condition of the animals, as well as with the length and degree of underfeeding. The effect was most noticeable in the epithelial elements and in the partly developed follicles.

Further experiments led to the conclusion that the ovum is responsible for the growth of the follicle and, ultimately of the ovary itself. Other factors which produce underweight, such as thyroid feeding, were found to have the same effect on the ovaries. The uterus in such cases was found to be thin and inactive, however the structures representing the so-called interstitial glands in other species, were well developed.

R. E. WOBUS.

Steinach and Kammerer: The Relation of Climate to Puberty. Archiv fuer Entwicklungsmechanik, 1920, xlvi, 391.

It was found that by keeping young rats at relatively high temperature, evidence of puberty developed much earlier than in similar rats kept at ordinary room temperature. The higher the temperature, up to 35° C., the greater the development. Above this temperature, there was, if anything, a retardation. Primarily, the interstitial cells of testis and ovary were affected, which, in turn, caused enlargement of the seminal vesicles and prostate in the male and the uterus in the female.

This bears out observations on the development of puberty in man.

As we near the tropics, puberty appears increasingly early, while at, or near the equator, it is often retarded. Poor food and other deleterious factors may also retard puberty. Women in the far North menstruate sparingly, some Esquimaux only during summer. At high altitudes, puberty appears late. However, immigrants passing from one climate into another, frequently mature at the same age as if they had remained at home, even for several generations.

Another interesting observation on man, which was borne out by these experiments on rats, is the fact that, as we approach the tropics, the external sex characteristics, such as the distribution of hair, approach each other in the two sexes. R. E. WOBUS.

Wiltshire: Basal Metabolism in Menstruation. Lancet London, 1921, cci, 388.

The theory that the life processes of women undergo a periodic variation correlated with menstruation has been frequently suggested, and the effect of menstruation on the life processes of women studied in various ways.

The author undertook a series of experiments comparing the physiologic processes in the menstrual and intermenstrual periods. The points chosen for determination were: (1) the basal metabolic rate of normal women during menstruation and between menstrual periods; (2) the cost to the organism of a certain definite piece of work and (3) the rate of recovery from that work.

The observations were made on five subjects, the basal metabolism being determined each day during the menstrual periods and three or four times between these periods.

The results obtained showed that the basal metabolism was not appreciably affected by menstruation. The cost of work to the organism, and the rate of recovery from work were the same during the menstrual and inter-menstrual periods. The author concludes, that while more experiments must be done before any definite conclusions can be drawn, the processes appear to be identical during the menstrual and intermenstrual periods. NORMAN F. MILLER.

Clow: Menstruation during School Life. British Medical Journal, 1920, No. 3119, 511.

The author as medical inspector of a large girls' school had the opportunity of studying the menstrual function in 1200 healthy girls. The ages of these girls varied from 9 to 21 years. All of them were interviewed and examined once. The following information was secured: Regular menstruation occurred in 53.8 per cent; irregular menstruation in 46.1 per cent; no pain or discomfort in 73.0 per cent; discomfort or slight pain in 24.6 per cent; severe pain in 2.4 per cent; incapacitated 5.3 per cent; malaise 9.0 per cent; rest required during the period 23.0 per cent; baths taken during the period 23.4 per cent; games and usual exercise continued during the period 40.7 per cent; constipation during the period 9.0 per cent. The girls were advised to act normally during their periods, to bathe and exercise (except swimming) as they would do unless sick from some other cause. Of these girls 734 were seen more than once after having followed this advice and the following results were noted: Those having no dis-

ability rose from 67 per cent to 85 per cent; a reduction in those suffering from pain or malaise from 41 per cent to 17 per cent; that 6 per cent instead of 20 per cent lie down during the period; that there is an increase in the number taking baths and exercise and a decrease of those having constipation. Those suffering pain were greatly relieved by the use of the hot bath and taking exercise during the period. The general conclusions of the author are: (1) The majority of school girls are free from any menstrual disturbance; (2) If no unnatural restrictions are imposed, the proportion of girls free from any menstrual disturbance tends to increase; (3) girls in normal health should be encouraged to take baths and exercise during the menstrual period; (4) the amenorrhea to which school girls are subject is not caused by mental strain; (5) study *per se* is not a cause of dysmenorrhea, although if pursued to the exclusion of daily exercise it may become indirectly a contributory factor. F. L. ADAIR.

Rosenbloom: Influence of Menstruation on the Food Tolerance in Diabetes Mellitus. Journal American Medical Association, 1921, lxxvi, 1742.

Substantiating the claims of Naunyn and of Harrop and Mosenthal, Rosenbloom found the sugar tolerance markedly reduced during menstruation in two cases which he studied. R. E. WOBUS.

Schick: Menstrual Poison. Wiener klinische Wochenschrift, 1920, xxxiii, 395.

The author discovered accidentally that if his housemaid held flowers in her hand for several minutes, while she was menstruating, and then put them in water, the flowers withered more quickly than they did when she was not menstruating. He instituted experiments during four successive months using as controls women who were not menstruating and found that this same result was obtained each time, with the flowers held by the housemaid, while those held by the controls lasted a normal length of time; that the influence was most positive on the second, third, and fourth days of the flow; that sweat from the axilla seemed to contain the poison; that the blood corpuscles contained it and the blood serum did not; and that heating the menstrual blood up to 100° C. did not affect the result. A search of medical literature threw no light on the subject. A search of folk lore showed that the country people had traditions and ideas that menstruating women should not handle flowers or fruit; that florists laid off their workers during menstruation; that during menstruation women should not make bread, preserves, beer, wine, sauerkraut or butter because the various products spoiled. He calls the probable poison menotoxin and plans further experiments and considers its possible influence in the etiology of sterility, skin diseases, epilepsy and other diseases. FRANK A. PEMBERTON.

Stickel and Zoudek: The Menstrual Blood. Zeitschrift für Geburtshilfe und Gynaekologie, 1921, lxxxiii, 1.

The authors have made an exhaustive investigation of the morphologic and the physical properties of the menstrual blood, also a

comparative study of the circulating blood of the menstruating woman. For a satisfactory study, the menstrual blood must be taken directly from the uterine cavity, as morphologic changes, especially sedimentation, take place on the way through the cervix. The blood must be thoroughly mixed before study as it has a tendency to deposit on shreds of mucous membrane.

The circulating blood shows no changes in morphologic constituents or in hemoglobin during menstruating except for a slight relative lymphocytosis.

The menstrual blood shows an oligocythemia, and a leucopenia; the white cells vary more than the red, the averages are 2,999,000 rbc and 3160 wbc. There is a relative lymphocytosis, 62 per cent with decreased polynuclears and no change in other types. Menstrual blood which has flowed through the cervix shows fewer lymphocytes.

The hemoglobin is regularly reduced but not proportional to the erythrocyte count. The color index is usually more than one. This is due to a partial hemolysis in the menstrual blood in the uterus. There are definite physical changes in specific gravity, osmotic pressure, etc.

There was no change in the fragility of the red cells either in menstrual or circulating blood. The hemolysis in menstrual blood is probably due to the action of a ferment produced by the uterine mucosa.

The coagulation time of the circulating blood is not changed during menstruation. Menstrual blood has lost its coagulability—showing no clots even after 24 hours. The coagulability is lost in the uterine mucosa. Blood obtained during menstruation by puncture of the cervix clots normally. MARGARET SCHULZE.

Graff and Novak: Regressive Gland Changes of the Endometrium in War Amenorrhea. Zeitschrift fuer Geburtshilfe und Gynaekologie, 1921, lxxxiii, 502.

The authors describe certain regressive gland changes in the endometrium in cases of so-called war amenorrhea, a condition which they regard as a nutritive disturbance secondary to the lack of protein in the war diet. These include changes in the shape, arrangement, and staining characteristics of the cells, which become pointed toward the base, lose their basement membrane, and are arranged almost circular to the gland axis, or may show a spiral onion-peel-like arrangement. The protoplasm becomes fibrillar, darkly eosin staining, the nuclei deep-staining homogeneous and of rod or comma-like form. The most marked changes of this type are found in the atrophic endometrium but they are also found in the resting stage and sometimes even in the mucosae which show definite cyclic phases. They are not dependent on the duration of the amenorrhea nor do they allow of conclusions concerning the prognosis. MARGARET SCHULZE.

Garling: On the Leucocytic Blood Picture during Menstruation. Deutsches Archiv fuer klinische Medizin, 1921, clxxv, 356.

The influence of menstruation on the endocrine system and the vegetative nerve apparatus has been much studied lately, but in view of the contradictory conclusions the writer undertook tests of the leucocytic picture in 37 normal and 9 diseased girls and women. The tests were made at the beginning of menstruation. The healthy per-

sons were nearly all young women without stigmata of hyperexcitability of the vegetative nerve system; persons with accidental eosinophilia were also excluded. Of the 9 diseased persons, six showed eosinophilia even when not menstruating. The results of the tests were that there was no noticeable increase of the total number of leucocytes during menstruation. An increase in eosinophilia was seen in 15 out of the 37 healthy women, but in 14 there was a decrease. In the 9 pathologic tests, there was an increase of eosinophils in 4 cases and a decrease in 5. The lymphocytes increased in 17 of the 37 healthy women, and decreased in 11 cases. In the 9 diseased cases, there was an increase of lymphocytes 5 times. The mononucleates increased over 1 per cent in 11 out of the 37 healthy cases, and decreased over 1 per cent in 7 cases. In the 9 ill persons 5 showed increase up to 1.5 per cent, and 2 cases decreased up to 1 per cent.

AMERICAN INSTITUTE OF MEDICINE.

Novak and Graff: A Contribution to the Clinical and Pathological Anatomy of Amenorrhea. Zeitschrift fuer Geburtshilfe und Gynaekologie, 1921, lxxxiii, 289.

This report is based on the examination of curettings from 111 cases of amenorrhea in women from fifteen to thirty-nine years of age. Fifty-eight of the cases were the so-called "war amenorrhea," 16 cases presented marked grades of genital hyperplasia sufficient to account for the absence of menstruation, the others were distributed among cases of genital and extragenital tuberculosis, superinvolution, severe psychic trauma, extragenital hemorrhage, climatic change, etc. The authors found that even in the absence of menstrual bleeding, cyclic changes occur in the uterine mucosa which may be interpreted as the result of more or less complete ovulation. Three histologic types may be defined: Mucosae which represent a definite phase of the menstrual cycle; well-preserved mucosae without sign of proliferative change (resting endometrium) and finally mucosae which show well-marked atrophy. Transitional types may be seen, cyclic changes and signs of atrophy found in the same specimen. The severity of the change did not always depend upon the duration of the amenorrhea. The condition of the endometrium allows conclusions concerning the anatomical and functional condition of the ovaries which are of importance in making a prognosis. Curettage appears to favor the reestablishment of menstruation.

MARGARET SCHULZE.

Adler: Meno- and Metrorrhagia. Wiener klinische Wochenschrift, 1921, xxxiv, 378.

The author divides pathologic uterine bleeding into (1) Accidental and (2) Functional. The first group comprises bleeding due to erosions, polyps, carcinoma, etc. The second is concerned with the physiologic function of the genital organs as in (a) adolescence; (b) myoma, adnexal disease, retroversion, etc.; and (c) without gross pathology.

Hitschman and Adler have shown that endometritis and metritis do not cause bleeding. The author believes that the bleeding is controlled by the internal secretion of the follicles in the ovary. Salpingitis is not accompanied by bleeding until the ovaries are affected by the inflammation, which causes hyperemia and increased physiolog-

ical activity. Examination of such ovaries shows many ripened follicles and no corpora lutea. On the other hand, if a corpus luteum is removed at an operation, menstrual-like bleeding appears in two or three days.

In addition to this the musculature of the uterus plays a part. The flabby uterus of the multipara and the weakly musculed uterus of the hypoplastic type, bleed longer than the normal nulliparous uterus.

Curettage is of little use as a treatment. The indications for it are (1) incomplete miscarriage; (2) question of malignancy and other diagnostic purposes; and (3) as a temporary means of stopping the flow. Curettage is useless as treatment for extrauterine pregnancy and myoma, and dangerous in salpingitis.

Medical treatment consists in the use of secacornin, ergotin and catorin, combined with climatic, balneologic and hygienic methods. Calcium preparations help sometimes. Lately organo-therapy by the use of hypophyseal, mammary, thyroid, pituitary, and especially corpus luteum preparations has found favor. Further, x-ray treatment is especially useful. Radium should not be used in the bleeding from benign causes because it is dangerous. The principal rule in treatment is to individualize each case. FRANK A. PEMBERTON.

Phillips: The Treatment of Uterine Hemorrhage Not Associated with Pregnancy. British Medical Journal, Feb. 12, 1921, No. 3137, p. 224.

The author divides uterine bleeding into three groups, that occurring (1) at puberty, (2) during the childbearing years, (3) about the menopause. The first he considers as probably due to imperfect balance between the various internal secretions. This, he thinks, usually rights itself. The second is most commonly caused by the presence of fibroids. He thinks hysterectomy is indicated in almost every case associated with bleeding, either menstrual or intermenstrual. He also considers excessive bleeding as due to hypertrophy of the ovaries. He enumerates the following causes of hemorrhage at the menopause: (a) Cervical cancer (b) uterine fibrosis, (c) changes in endometrium which presumably cause uterine bleeding as the result of a deficiency in thrombokinase, (d) certain cases in which no abnormality can be found. These he considers to be due to some abnormality of the internal secretions. F. L. ADAIR.

Herrmann: The Influence of Lipoids from Corpus Luteum and Placenta on Uterine Hemorrhages, the Menstrual Cycle and Menopause Symptoms. Monatsschrift für Geburtshilfe und Gynäkologie, 1921, liv, 152.

This investigator undertook a clinical experiment to determine the effect of a corpus luteum-placenta lipoid prepared by "Gesellschaft für chemische Industrie" in Basel.

The cases chosen were those with excessive bleeding due to an abnormality of ovarian function with or without an accompanying pelvic inflammatory condition.

Among 73 such patients he had good immediate results in 95 per cent and satisfactory permanent results in 74 per cent. The cases that responded best to the intramuscular injection of the preparation were those with menorrhagia or metrorrhagia; the presence of an in-

flammatory reaction in the pelvis apparently did not interfere with the regulatory action. Excessive bleeding in young girls at the time when the menstrual function was being established likewise responded extremely well. Hemorrhage at the menopause reacted promptly but the results were not lasting. EVERETT D. PLASS.

Forssner: The Results of Operative Treatment of Dysmenorrhea. Uppsala Läkäreforeningens Forhandlingar, 1921, xxvi, 5.

No definite pathologic-anatomical change in the sexual organs of women is causing dysmenorrhea. There are, however, certain findings which usually go together with this symptom. For instance, myoma uteri and intrauterine polyps are very often accompanied by dysmenorrhea. In many patients with dysmenorrhea there is an aplasia of the sexual organs with retroflexio uteri, but in most of the cases no anatomical change can be found. The author started with the idea that dysmenorrhea was one of the symptoms of a nervous constitution, or in other words that it was one of the symptoms of a neurosis. This idea had to be given up. The actual cause of the pain is contractions of the uterus, but what the causes of these contractions are has never been determined. The pain is present before and during the first day of the menstruation and the author thinks that the most logical explanation is that hemorrhages take place in the mucous membrane of the uterus. A resulting tension seems to produce the painful contractions. When the tension in the mucous membrane, after some hours, has subsided, the irritation causing the contractions ceases.

It is his further experience that dysmenorrhea usually stops when a delivery has taken place. This harmonizes with the explanation mentioned above. After the delivery the uterine cavity never goes back to its former size. For this reason a hemorrhagic swelling of the endometrium will not cause the same degree of irritation as when the cavity is very small. Furthermore, the uterine musculature seems after delivery to be less able to go into convulsive contractions than before.

In the years 1910-1919 the author has had 153 cases of dysmenorrhea in nulliparae without any pathologic-anatomical findings. In 42.5 per cent of these cases an operation was advised, but never before psychic treatment had been tried. The patients were usually told that they did not suffer from any dangerous disease, that they must not pay any attention to the pain and go on with their usual work. If this treatment, after a longer period of time, did not seem to help, an operation was suggested. The operations were usually done in two steps; first, a dilation of the cervix. Hegar dilators No. 10-11 were introduced; then the uterine cavity packed with gauze for 48 hours. Second step: After removal of gauze, the cervix was again dilated up to Hegar No. 20, an abrasion done and the uterus repacked with gauze for another 48 hours.

Of the operated cases 46 per cent were completely cured, 34 per cent greatly benefited. They could perform their work which previously had been impossible for them. The pain still existed but they never had to go to bed. In the other 20 per cent the operation did not seem to have any effect. The author's patients have been followed for periods up to 10 years after the operation. KIRSTEN UTHEIM.

Item

AT a recent meeting of the Joint Committee of the American Gynecological Society and the American Child Hygiene Association, appointed to consider problems on Maternal Welfare, it was decided to give some publicity to the following report with the idea of eliciting constructive criticism. The personnel of the Committee is as follows: American Gynecological Society: Dr. Geo. W. Kosmak, New York; Dr. Fred Taussig, St. Louis; Dr. Fred L. Adair, Minneapolis. American Child Hygiene Association: Dr. J. Whitridge Williams, Baltimore; Dr. Anna E. Rude, Washington, D. C.; Dr. Merrill E. Champion, Boston. American Pediatric Society: Dr. Henry L. K. Shaw, Albany; Dr. Fritz Talbot, Boston; Dr. Walter Ramsay, St. Paul. The program has been tentatively accepted by the American Gynecological Society and the American Child Hygiene Association, but has not yet been presented to the American Pediatric Society for action.

It is suggested that communications be sent to Dr. Fred L. Adair, Chairman, 730 La Salle Building, Minneapolis, Minnesota. Any member of the above Committee, however, will welcome suggestions or inquiries regarding the above program.

The Committee considers its proper functions to be:

A. Elaboration of a complete scheme of maternal welfare as ideally developed, emphasizing the most important points for starting the development of such a plan with the idea of educating the public to the necessity of this work and to serve as a basis for governmental activity. The following skeleton plan is presented:

I. Preservation of life and health of the mother.

a. Decrease in the number of infections following abortion and childbirth.

b. By providing better trained attendants.

c. By educating the laity as to the proper preparation and necessity for proper supervision during pregnancy, etc.

d. Inspection and control of institutions, etc., caring for maternity cases.

e. Prevention and treatment of venereal disease in association with pregnancy.

f. Control of toxemias.

II. Increase in the number of fruitful pregnancies by

a. Decrease in the amount of sterility.

1. By diminution in the number of infections following abortion and childbirth.

2. By diminution of venereal disease, especially gonorrhea.

b. Diminution in the number of abortions by
   1. Diminution in the number of spontaneous abortions by educating as to proper care when threatening symptoms develop.
   2. Diminution in the number of induced abortions.
      (a) self induced; (b) criminal operations; (c) therapeutic abortions.

N. B. (1) We recommend that hospitals require the written sanction of at least two reputable medical men before permission to perform an abortion is granted.

(2) We recognize the desirability of making abortions reportable to the health authorities.

c. Diminution of the number of premature births and deaths.
   1. Education and supervision.
   2. Provision for proper care of premature infants.
   3. Recognition and treatment of syphilis.

d. Diminution in the number of stillbirths.
   1. Improvement of statistics and methods of reporting stillbirths with causes.
   2. Education of laity and profession.
   3. Provision of better antepartum and intrapartum care.
   4. Better care of syphilities.

e. Diminution in the number of neonatal deaths.
   1. Recognition of the importance of these deaths.
   2. Methods of prevention.
   3. Education of laity and profession.
   4. Provision of better antenatal, intrapartum and postpartum care.

N. B.—More careful scientific study of both stillbirths and neonatal deaths, together with causes of abortion, miscarriage and premature birth.

III. Better facilities for the care of the unmarried mother for her own protection and that of her off-spring.

B. Definition of the relationship of this work to other health and welfare activities such as infant and child welfare; venereal disease campaign; antituberculosis; boards of health; Red Cross and nursing activities, as well as social agencies; certain eugenic problems.

C. To have some responsible agency of representatives and well qualified men to advise with the governmental agencies on the problems of maternal welfare. This may be enlarged to become a part of a sort of institute or academy of sciences which could well be an advisory body on matters pertaining to public health and welfare.

D. It is particularly important to work out problems of maternal and child welfare in cooperation with the pediatrists, by means of a joint committee representative of the leading national societies. We recommend that this joint committee on maternal welfare, work with one representing the American Pediatric Society to elaborate maternal and infant welfare programs.

Correspondence

Dec. 29, 1921.

Editor AMERICAN JOURNAL OF OBSTETRICS & GYNECOLOGY.
Sir:

I wish to bring to the attention of gynecologists and general surgeons, particularly the latter because of their radicalism and lack of general sound judgment where a gynecologic question is involved, the fact that we should be more conservative in our operative treatment of ectopic pregnancies. The great majority of operators are indiscriminately removing the tubes in these cases, even though they may leave the ovaries. I find that this is entirely unnecessary, no more necessary than it would be to remove the uterus for an incomplete abortion. This applies not only to the tubal abortions, complete and incomplete, but also to certain types of ruptured tubes where the bleeding can be easily stopped by a carefully applied suture of whipped over fine catgut. In some cases it is necessary to loop a suture around the pelvic side of the broad ligament, either above the ovary or sometimes below it. Tubes can easily be stripped of their contents through their fimbriated extremity or split open, doing a salpingotomy with removal of the contents and a closure.

Our object is or should be, primarily, a stopping of hemorrhage, if present, or the carrying out of such technic as will do away with the possibility of recurrence, and not mutilation.

This has undoubtedly been done by many. I cannot feel that there is any originality in the proposition, it is perfectly obvious and simple, but I wish to bring it to the attention of the profession generally.

Yours very truly,
ALBERT M. JUDD, M.D.

BROOKLYN, N. Y.